

REMARKS

The application was filed with claims 1-44. Claims 1-44 and 54-67 were canceled by previous amendment. Claims 68 and 69 were added by previous amendment. Claims 46 and 68-69 have been canceled herein. New claims 70-82 have been added herein. Therefore, claims 45, 47-53, and 70-82 are pending. Claim 45 has been amended herein.

Supplemental Information Disclosure Statement

Enclosed herewith is a Supplemental Information Disclosure Statement with PTO Form-1449. Consideration of the information cited therein and indication of same is respectfully requested.

Claim Amendments

Claim 45 has been amended herein to recite, *inter alia*, "a gallic acid content of less than about 1.0 parts by weight (pbw)." No new matter has been added by this amendment. Support for these amendments can be found throughout the specification, as filed, and specifically at, *inter alia*, page 6, line 24 of the specification, as filed.

New Claims

New claims 70-79 further define the claimed aqueous treating compositions. Claim 70, and those claims depending therefrom, recite, *inter alia*, "A two-part aqueous treatment comprising: a. a first aqueous treating composition comprising tannic acid; and b. a second topical treating composition comprising a fluorochemical." No new matter has been added by the new claims. Support for these claims can be found throughout the specification, as filed, for example at pages 17-19 and 29, and specifically in the original claims.

Claims 80-82 are directed to a fiber, yarn or carpet comprising tannic acid and a topically applied fluorochemical. No new matter has been added by the new claims. Support for these claims can be found throughout the specification, as filed, for example at pages 17-19, and 29 and in Tables 4, 6, 8, and 10.

Other Amendments

Please amend the Attorney Docket No. to 03269.0109U1.

Arguments made in Office Action

While the Office Action concedes that the cited references are silent with respect to the gallic acid content of the tannic acid components (*see* Office Action mailed June 13, 2006 at page 3) and, therefore, cannot anticipate the pending claims, the Office Action alleges that the pending claims are obvious over the cited references for essentially three reasons:

First, the Office Action contends that “since gallic acid is acquired by the hydrolysis of tannic acid it would have been within the level of the skilled artisan to arrive at the gallic acid content absent a showing to the contrary.” *See* Office Action mailed June 13, 2006 at page 3.

This argument is factually incorrect in that the hydrolysis of tannic acid to produce gallic acid would instead increase the amount of gallic acid present in the composition rather than to provide the claimed compositions having the recited low levels of gallic acid. In fact, the skilled artisan knowing that the hydrolysis of tannic acid produces gallic acid actually teaches away from selecting the low levels of gallic acid (*i.e.*, “less than about 1.0 parts by weight”) recited in claim 44 and those claims depending therefrom.

Second, the Office Action contends that “it is well known to the skilled artisan to optimize percentages . . . [and] by stating that any commercially available tannic acid can be used is a reasonable assumption that tannic acids of a range of gallic acid contents could be employed in a beneficial or synergistic manner” (*see* Office Action mailed June 13, 2006 at page 3) and concludes that the claims are obvious. In support of this argument, the Office Action cites *In re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir. 2003) (“The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages.”) (A copy is attached hereto as Exhibit A).

In *Peterson*, the claimed invention concerned “[a] nickel-base superalloy . . . consisting essentially of about 1 to 3 percent rhenium [and] about 14 percent chromium.” *In re Peterson*, 315 F.3d at 1327. The Examiner had rejected the claim as obvious in view of the Shah reference, which disclosed “very broad ranges for rhenium (0-7%) and chromium (3-18%).” *Id.* at 1328. The Court upheld the rejection and held that “selecting a narrow range from within a somewhat broader range disclosed in a prior art reference is no less obvious than identifying a range that simply overlaps a disclosed range.” *Id.* at 1330 (emphasis added). In this case, the prior art taught that the alloy could consist essential of rhenium and chromium and set forth somewhat broader ranges (0-7% and 3-18%, respectively) for the rhenium and chromium content.

In contrast, in *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (A copy is attached hereto as Exhibit B), the claimed invention concerned a wastewater treatment device with a ratio of tank volume to contactor area of 0.12 gal./sq. ft., the optimum value in that it maximizes “treatment capacity” so that the effectiveness of a given contactor is maximized. The Examiner had rejected the claim as obvious in view of the El-Naggar reference, which disclosed the basic device in question, but failed to teach a ratio of tank volume to contactor area. The Court explained:

While the ratio of tank volume to contactor area of 0.12 gal./sq. ft. is not disclosed in El-Naggar, the examiner reasoned that the disclosure of El-Naggar would make a device with that optimum value obvious. The examiner noted that El-Naggar suggests increasing the “efficiency” (degree of purification) of his device by increasing the contactor area while apparently keeping the “throughput” constant, that is, reducing the “hydraulic loading.” The examiner then assumed that El-Naggar teaches keeping the tank volume constant while increasing the contactor area. Thus, the examiner argued that the idea of increasing tank volume to surface area to increase efficiency is taught and that working out the value for optimum efficiency is mere mechanical experimentation. The board accepted the examiner's reasoning.

In re Antonie, 559 F.2d at 619.

The Court reversed the board's decision, holding that "[i]t is impossible to recognize, from . . . El-Naggar, that 'treatment capacity' is a function of 'tank volume' or the tank volume-to-contactor area ratio. Recognition of this functionality is essential to the obviousness of conducting experiments to determine the value of the 'tank volume' ratio which will maximize treatment capacity." *Id.* at 620. Said another way, the prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.

In vain, the Patent Office then argued that it is within the level of the skilled artisan to vary every parameter in order to optimize a system:

The PTO and the minority appear to argue that it would always be obvious for one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system even if there is no evidence in the record that the prior art recognized that particular parameter affected the result. As we have said many times, obvious to try is not the standard of 35 USC 103. Disregard for the unobviousness of the results of "obvious to try" experiments disregards the "invention as a whole" concept of § 103 and overemphasis on the routine nature of the data gathering required to arrive at appellant's discovery, after its existence became expected, overlooks the last sentence of § 103.

Id. (internal citations omitted).

The Court rejected this argument and, therefore, it is long-established that only the optimization of a result-effective variable is *prima facie* obvious. *See In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). That is, the skilled artisan would not attempt to optimize a percentage if the artisan did not understand that there exists a relationship between the percentage and the desired result.

Accordingly the Office Action's argument is legally incorrect because the gallic acid content as a result-effective variable was unrecognized until the instant application's disclosure. Here – analogous to *Antonie* and distinct from *Peterson* – the cited references do not recognize that the amount of gallic acid in tannic acid can affect stain resistance, as recited in the instant

claims, and one of skill in the art would not have known that the gallic acid content could affect the properties of the claimed compositions. Therefore, the Office Action has not set forth a proper *prima facie* obviousness rejection, and the rejection must be withdrawn.

Third, the Office Action contends that applicant's Caustic 10 Total (Macbeth) . . . is not unexpected" (see Office Action mailed June 13, 2006 at page 4) and concludes that the claims are obvious.

This argument is factually incorrect in that the claimed compositions can be used to treat, e.g., a fiber, yarn or carpet and provide markedly improved resistance to discoloration, or "browning," which can be caused by contact of a treated fiber, yarn, or carpet with relatively high pH cleaning compositions. Nonetheless, in order to expedite prosecution, Applicants have amended the pending claims to recite compositions that more clearly demonstrate improved resistance to discoloration.

Claim Rejections under 35 U.S.C. § 103

The Office Action has rejected claims 45-50 and 52 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,738,688 to De Lathauwer (hereinafter "De Lathauwer"). The Office Action has also rejected claims 45-47 and 68-69 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,482,646 to Gamblin (hereinafter "Gamblin"). The Office Action has also rejected claims 45-47 and 68-69 under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 4,094,701 to Fekete (hereinafter "Fekete"). The Office Action has also rejected claims 51 and 53 under 35 U.S.C. § 103(a) as allegedly being unpatentable over De Lathauwer in view of U.S. Patent No. 5,520,962 to Jones, Jr. (hereinafter "Jones").

Applicants respectfully disagree that the pending claims are obvious in view of the cited references. That is, amended independent claim 45 and claims 47-53 that depend therefrom recite, *inter alia*, tannic acid having a gallic acid content of less than about 1.0 parts by weight, which is not taught or suggested by De Lathauwer, Gamblin, Fekete, Jones, or any combination thereof. Likewise, new independent claim 70 and claims 71-79 that depend therefrom recite a

two-part aqueous treating composition comprising a first aqueous treating composition comprising tannic acid and a second topical treating composition comprising a fluorochemical, which is not taught or suggested by De Lathauwer, Gamblin, Fekete, Jones, or any combination thereof.

- **The Office Action fails to establish a *prima facie* case of obviousness for claims 45 and 47-53**

To the extent that the Office alleges that the combination of a tannic acid and a fluorochemical would be rendered obvious by De Lathauwer, Gamblin, Fekete, Jones, or any combination thereof, *see* Office Action mailed June 16, 2006 at pages 2-3, the Office fails to set forth a proper *prima facie* obviousness rejection.

As explained fully in the Arguments made in Office Action section, *supra*, only the optimization of a result-effective variable is *prima facie* obvious. *In re Antonie*, 559 F.2d 618, 195 USPQ 6 (CCPA 1977). Neither De Lathauwer nor Gamblin nor Fekete nor Jones nor any combination thereof recognized that the gallic acid content in tannic acid can affect the stain resistance properties of, *e.g.*, fiber, yarn or carpet treated with the claimed compositions, much less that a gallic acid content of less than about 1.0 parts by weight can significantly improve the stain resistance properties of, *e.g.*, fiber, yarn or carpet treated with the claimed compositions. Accordingly, one of skill in the art would not have known that the gallic acid content could affect the properties of the claimed compositions; therefore, the Office Action has not set forth a proper *prima facie* obviousness rejection, and the rejection must be withdrawn.

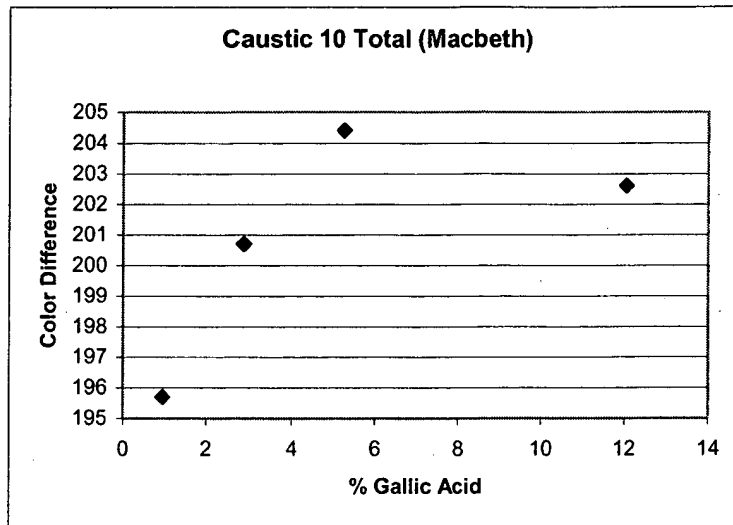
Moreover, even if the Office Action had properly set forth a *prima facie* obviousness rejection of any of the current claims for, *which it did not*, Applicants' specification provided disclosures and data on unexpectedly superior properties associated with the currently claimed compositions that would be sufficient to overcome any such *prima facie* rejection. In particular, the currently pending application teaches, *inter alia*, that the methods of the present invention provide markedly improved resistance to discoloration, or "browning," which can occur frequently during routine maintenance of the treated fiber, yarn, or carpet with high pH cleaning

compositions. This can be evaluated, for example, by measuring the color difference in a treated fiber, yarn, or carpet before and after application of a 10% by weight sodium hydroxide solution (“Caustic 10”; *see* specification at page 30). The color difference can be evaluated by using a Macbeth contact spectrophotometer model 20/20 (“Macbeth”) or by using a visual gray scale rating system as described in ISO 105-A02 (“ISO 105-A02”). *See* specification at page 30.

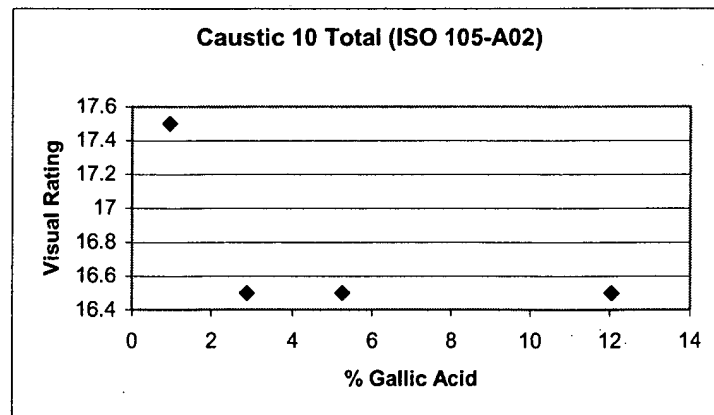
As described at page 31 of the specification, four tannic acids having differing gallic acid contents were evaluated. The “Caustic 10” test, using both the “Macbeth” and the “ISO 105-A02” measurement methods, was used to evaluate samples of treated fiber, yarn, or carpet, as set forth in Table 4 (page 38), Table 6 (page 41), Table 8 (page 44), and Table 10 (page 47) of the specification, as filed. Exemplary results are summarized below:

Tannic Acid	% Gallic	Caustic 10 (Macbeth)	Caustic 10 (ISO 105-A02)
ASP	0.96	195.7	17.5
3SP	2.87	200.7	16.5
CLM	5.26	204.4	16.5
BAYGARD® CL Liquid	12.05	202.6	16.5

A lower “Macbeth” measurement for the Caustic 10 test denotes that the samples have a smaller change in coloration (*i.e.*, less “browning”) due to exposure to a 10% by weight sodium hydroxide solution; this indicates superior stain resistance. Close inspection of these results reveals that the color difference (“Macbeth”) between samples before and after contact with a 10% by weight sodium hydroxide solution is substantially and unexpectedly lower for samples treated with tannic acid having less than about 1% gallic acid, as shown in the graph below:



Likewise, a higher “ISO 105-A02” measurement for the Caustic 10 test denotes that the samples appear less “browened” after exposure to a 10% by weight sodium hydroxide solution; this indicates superior stain resistance. The visual rating (“ISO 105-A02”) for samples contacted with a 10% by weight sodium hydroxide solution is unexpectedly higher for samples treated with tannic acid having less than about 1% gallic acid, as shown in the graph below:



Thus, the substantially superior resistance to browning observed when using the claimed compositions to treat, e.g., fiber, yarn or carpet indicates that the claimed compositions are not obvious over De Lathauwer, Gamblin, Fekete, Jones, or any combination thereof.

- **The cited references do not anticipate or establish a *prima facie* case of obviousness for claims 70-82**

New claims 70-82 are novel and non-obvious over De Lathauwer, Gamblin, Fekete, Jones, or any combination thereof.

- *The cited references do not teach or suggest all claim limitations*

First, the cited references do not teach or suggest each and every limitation of claim 70 or of claims 71-79 that depend therefrom. Specifically, neither De Lathauwer, nor Gamblin, nor Fekete, nor Jones, nor any combination thereof teaches or suggests a two-part aqueous treatment comprising a first aqueous treating composition comprising tannic acid and a second topical treating composition comprising a fluorochemical. Because this two-part combination is taught nowhere in the prior art, the claim cannot be anticipated or *prima facie* obvious.

Likewise, the cited references do not teach or suggest each and every limitation of claim 80 or of claims 81-82 that depend therefrom. A fiber, yarn or carpet comprising tannic acid and a topically applied fluorochemical is taught nowhere in the prior art and, thus, cannot be anticipated or *prima facie* obvious.

- *There is no suggestion or motivation to combine*

Second, neither De Lathauwer, nor Gamblin, nor Fekete, nor Jones provides a suggestion to so modify the disclosure of De Lathauwer. Specifically, although De Lathauwer arguably discloses a tannic acid for use as a stain resistance composition, De Lathauwer nowhere teaches or suggests the application of a second topical composition comprising a fluorochemical. Even if one or more of the cited references had taught or suggested the use of a fluorochemical in combination with a tannic acid treatment, *which it did not*, De Lathauwer nowhere teaches or suggests that the application of such a second topical composition is desirable.

Because motivation to modify the aqueous treating composition step of De Lathauwer to arrive at the instantly claimed methods of the pending claims is absent from De Lathauwer,

Gamblin, Fekete, and Jones, the Office Action has borrowed the requisite motivation from the disclosure of the instant application and, therefore, has engaged in impermissible hindsight reconstruction of the claimed invention. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to “[use] that which the inventor taught against its teacher.” *In re Lee*, 277 F.3d 1338, 1343 (Fed. Cir. 2002). Hindsight reconstruction cannot support a proper *prima facie* rejection for obviousness.

○ *There is no reasonable expectation of success*

Third, the cited references do not supply a reasonable expectation of success in arriving at the claimed invention, upon making the allegedly suggested combination. De Lathauwer, Gamblin, Fekete, Jones, and the Office Action all fail to provide any support for reasonable chance of success. At best, even an unsupported reference to “the art as a whole” can be used as evidence that it would be obvious to try a second topical fluorochemical composition in combination with a first tannic acid composition. However, as noted in MPEP § 2145, “obvious to try” is an improper standard under 35 USC § 103. This situation is analogous to the situation described by the *In re O’Farrell* court. Specifically, the court stated that:

In some cases, what would have been “obvious to try” would have been to vary all parameters or try each of numerous possible choices until one possibly arrived at a successful result, where the prior art gave either no indication of which parameters were critical or no direction as to which of many possible choices is likely to be successful.... In others, what was “obvious to try” was to explore a new technology or general approach that seemed to be a promising field of experimentation, where the prior art gave only general guidance as to the particular form of the claimed invention or how to achieve it.

In re O’Farrell, 853 F.2d 894, 903 (Fed. Cir. 1988).

Said another way, two references simply being “in analogous arts” is insufficient to provide any expectation of successful combination – much less a reasonable expectation – in the complete absence of any indication that the combination could provide an improvement or that the combination would be likely to be successful in providing that improvement.

- *Any alleged obviousness is rebutted by unexpectedly superior results*

Even if *arguendo* the Office could properly support a *prima facie* rejection of any of claims 70-82 for obviousness, *which it cannot*, Applicants' specification provided disclosures and data on unexpectedly superior properties associated with the currently claimed compositions that would be sufficient to overcome any such *prima facie* rejection. In particular, the currently pending application teaches, *inter alia*, that unexpectedly substantially superior stain resistance (for both total stain and for caustic) is achieved when using a two-part aqueous treatment comprising a first aqueous treating composition comprising tannic acid and a second topical treating composition comprising a fluorochemical. In the same way, the application teaches, *inter alia*, the unexpectedly substantially superior stain resistance of a fiber, yarn or carpet comprising tannic acid and a topically applied fluorochemical (*e.g.*, a fiber, yarn or carpet treated with a two-part aqueous treatment comprising a first aqueous treating composition comprising tannic acid and a second topical treating composition comprising a fluorochemical).

Review of the results from the Examples shows that the treatments of claims 70-79 and the fiber, yarn or carpet of claims 80-82 provide an improved Caustic 10% measurement (a lower number translates to decreased "browning") as well as an improved Total Stain measurement (a lower number translates to improved resistance to staining in general). A summary of data from Tables 3-10 (*see* pages 37-47 of the specification as filed) is tabulated in Table I below:

Table

Sample Conditions		ASP (0.96%) ¹ Table 4, p.38		3SP (2.87%) ² Table 6, p.41		CLM (5.26%) ³ Table 8, p.44		BayGard CL (12.05%) ⁴ Table 10, p.47	
		Caustic	Total	Caustic	Total	Caustic	Total	Caustic	Total
A	Beck Exhaust (De Lathauwer)	16.2	104.9	14.2	76	18.3	104.8	21.1	80.5
B	Beck Exhaust (De Lathauwer) plus fluorochemical in bath	26.6	133.1	27.7	121.8	24.8	83.2	23	84.4
C	Beck Exhaust (conventional SR)	16.5	51.2	17	57.1	17.1	50.15	15.1	47.4
D	Beck Exhaust (conventional SR) plus fluorochemical in bath	15.7	56.3	14.8	47.4	16	56.3	13.4	47.4
E	Continuous (De Lathauwer)	16.4	108.4	15.5	107	20.9	94.5	22.4	104.8

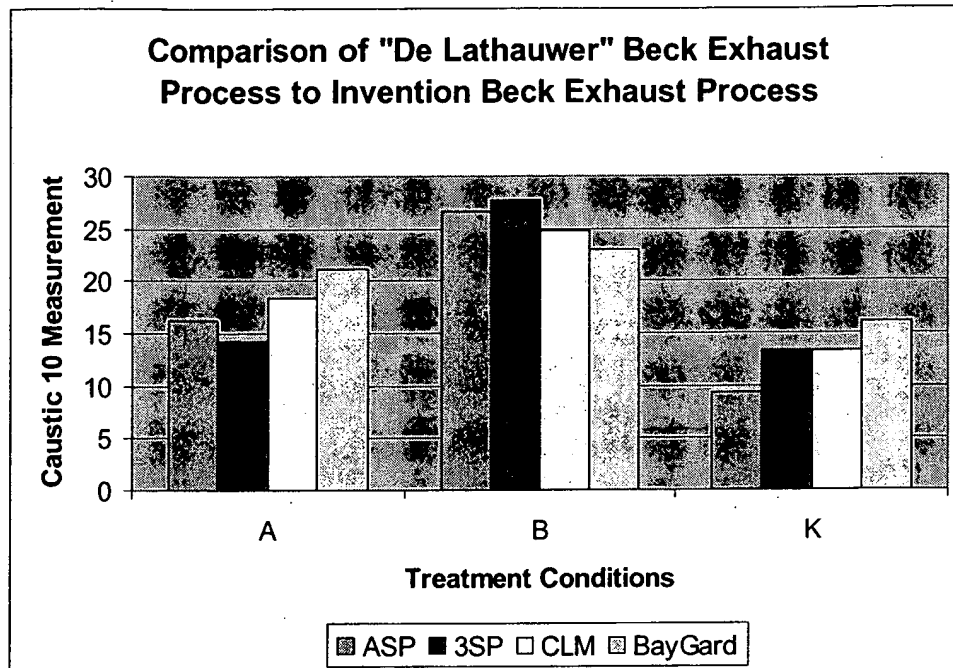
F	Continuous (De Lathauwer) plus Alum	16.7	80.9	19.9	96.1	13.3	66.7	10.1	67.4
G	Continuous (De Lathauwer) plus fluorochemical in bath	16.2	90.1	16.4	87.5	16	71.3	21.9	84.9
H	Continuous (De Lathauwer) plus fluorochemical in bath plus Alum	15.3	78.5	14.4	82.4	11.7	67.8	11.5	67.1
I	Continuous (conventional SR)	18.9	93.2	13.1	82.4	15.5	89.9	17.5	99.1
J	Continuous (conventional SR) plus fluorochemical in bath	21.7	52.6	21.7	55.6	25.6	74.15	25.5	71.3
K	Invention (Beck Exhaust)	9.4	31.3	13.3	45.5	13.3	46.2	16	47.8
L	Invention (Continuous)	6.1	35.9	12.7	56.05	11.9	58.1	5.1	50.4

- ¹ Conditions for Samples A-L for ASP treated samples/controls are taken from Table 3, page 37.
- ² Conditions for Samples A-L for 3SP treated samples/controls are taken from Table 5, page 40.
- ³ Conditions for Samples A-L for CLM treated samples/controls are taken from Table 7, page 43.
- ⁴ Conditions for Samples A-L for BayGard CL treated samples/controls are taken from Table 9, page 46.

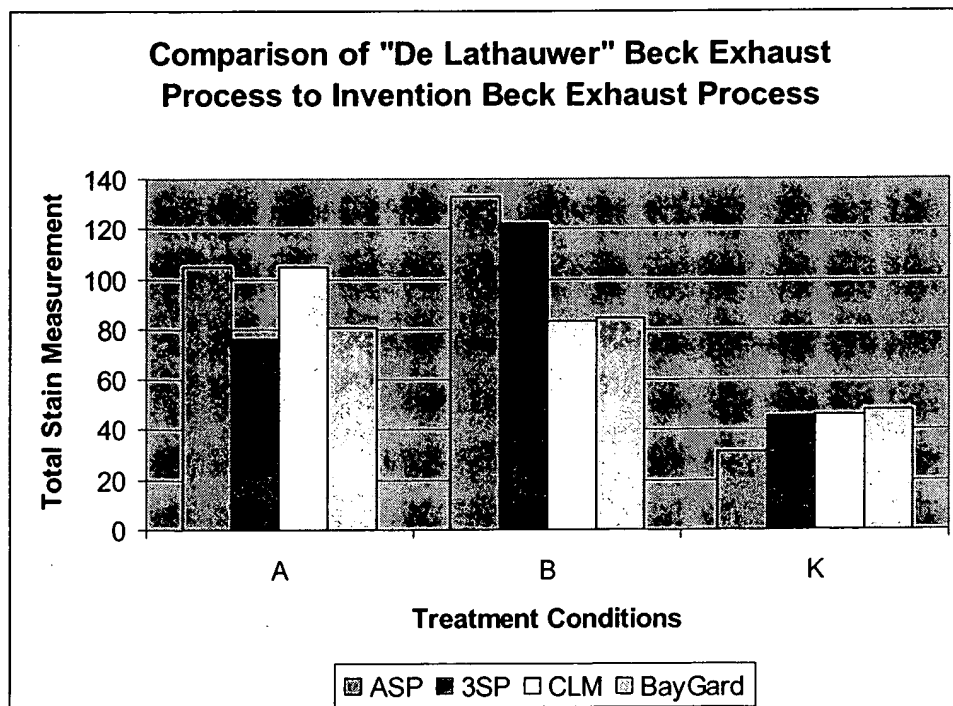
For example, comparison of a Beck Exhaust process and composition with treatment conditions analogous to those used in De Lathauwer (Table, entry A and Graph I, columns A) with a Beck Exhaust process and composition with treatment conditions as claimed in the present invention (Table, entry K and Graph I, columns K) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer) provide a substantially superior Caustic 10 measurement (here, as much as about, *e.g.*, 42% lower).

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Graph I



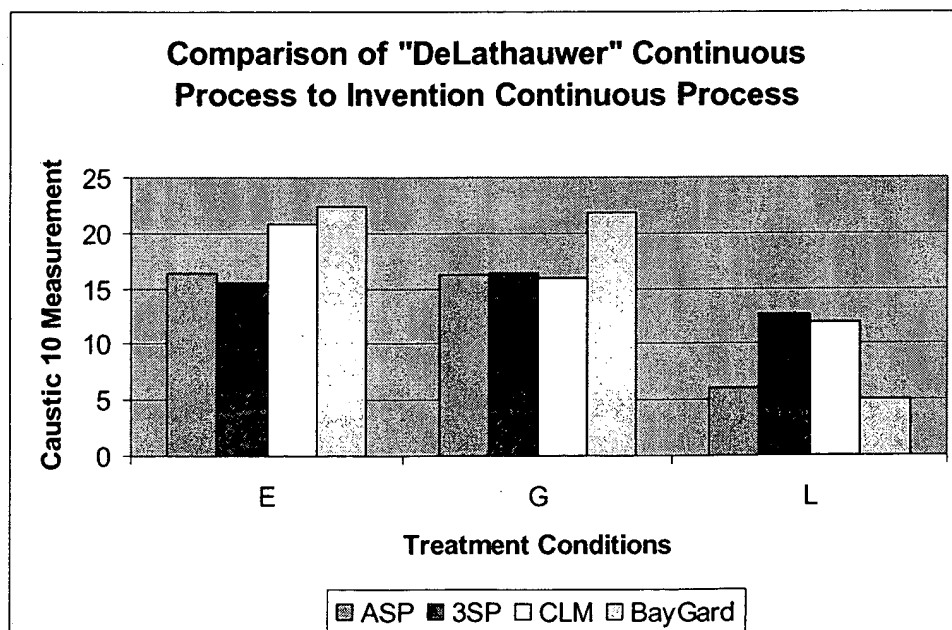
Graph II



Likewise, comparison of a Beck Exhaust process and composition with treatment conditions analogous to those used in De Lathauwer (Table, entry A and Graph II, columns A) with a Beck Exhaust process and composition with treatment conditions as claimed in the present invention (Table, entry K and Graph II, columns K) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer) provides a substantially superior total stain measurement (here, as much as about, *e.g.*, 70% lower).

Such improvement is also evident for the claimed compositions in a continuous process. Comparison of a continuous process with treatment conditions analogous to those used in De Lathauwer (Table, entry E and Graph III, columns E) with a continuous process with treatment conditions as claimed in the present invention (Table, entry L and Graph III, columns L) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer) provide a substantially superior caustic 10 measurement (here, as much as about, *e.g.*, 63% lower).

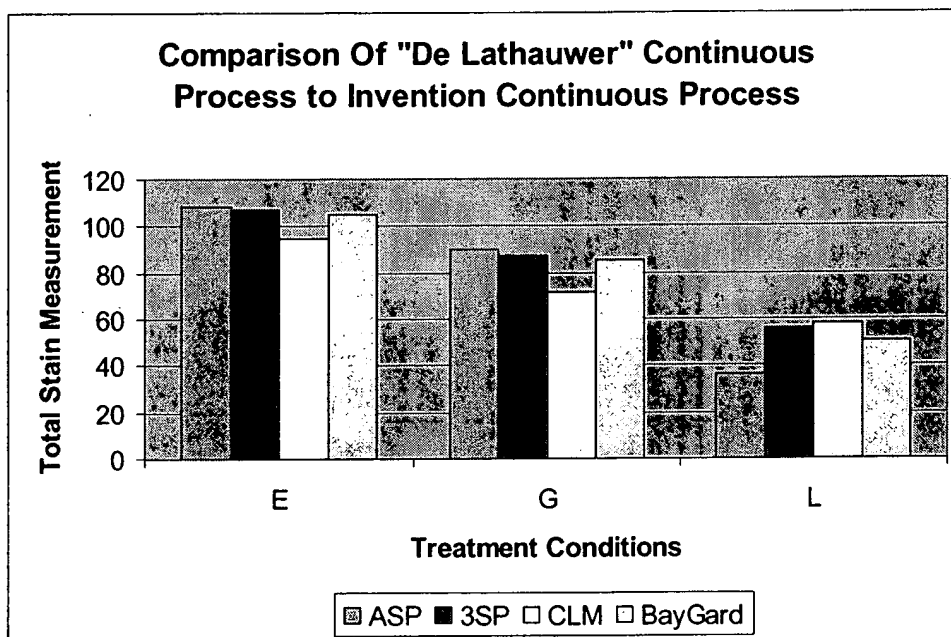
Graph III



Again, this improvement is also evident for the claimed compositions for total stain measurement in a continuous process. Comparison of a continuous process with treatment

conditions analogous to those used in De Lathauwer (Table, entry E and Graph IV, columns E) with a continuous process with treatment conditions as claimed in the present invention (Table, entry L and Graph IV, columns L) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer) provide a substantially superior total stain measurement (here, as much as about, *e.g.*, 67% lower).

Graph IV



No such improved stain resistance is disclosed anywhere in De Lathauwer, Gamblin, Fekete, or Jones. Accordingly, Applicants disclosures and examples of improved results for the claimed compositions would overcome any *prima facie* rejection for obviousness.

- **The alleged combination would not achieve the invention's superior results**

Even if one of skill in the art were motivated to combine the disclosures of two or more of De Lathauwer, Gamblin, Fekete, or Jones, *which one would not be*, the alleged combination would not provide the substantially superior results that are provided by the claimed method. More specifically, the simple combination of an aqueous tannic acid composition (De

Lathauwer) with a fluorochemical does not result in an improved composition for treating fiber, yarn or carpet, as claimed.

For example, comparison of a Beck Exhaust process with treatment conditions analogous to those used in De Lathauwer, but with added fluorochemical (Table, entry B and Graphs I and II, columns B) with a Beck Exhaust process with treatment conditions as claimed in the present invention (Table, entry K and Graphs I and II, columns K) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer), *even with added fluorochemical*, provides both substantially superior caustic 10 measurement and substantially superior total stain measurement. In fact, in some samples (*see, e.g.*, Graph I, columns B, all samples; Graph II, columns B, ASP and 3SP samples), the addition of a fluorochemical to a “De Lathauwer” treatment actually worsened stain resistance.

In the same way, comparison of a continuous process with treatment conditions analogous to those used in De Lathauwer, but with added fluorochemical (Table, entry G and Graphs III and IV, columns G) with a continuous process with treatment conditions as claimed in the present invention (Table, entry L and Graphs III and IV, columns L) demonstrates that the claimed compositions, when compared to conventional compositions (*e.g.*, those analogous to De Lathauwer), *even with added fluorochemical*, provide both substantially superior caustic 10 measurement and substantially superior total stain measurement.

Therefore, in view of the data presented in the Table and Graphs I-IV, any such obviousness rejection of new claims 70-79 would be overcome, necessitating withdrawal.

CONCLUSION

In light of the above arguments and amendments, the claims are believed to be allowable, and Applicant respectfully requests notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance.

A three-month shortened statutory period was set for response, nominally ending September 13, 2006. Therefore, this paper is timely. Payment in the amount of \$840.00, (reflecting the \$790.00 fee for the Request for Continued Examination and the \$50.00 fee for 1 total claim in excess of twenty), is enclosed herewith. The payment is to be charged to a credit card and is authorized by the signed, enclosed document entitled: Credit Card Payment Form PTO-2038. No further fee is believed due. However, the Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

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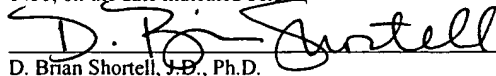
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D. Brian Shortell, J.D., Ph.D.

Sept. 5, 2006
Date

EXHIBIT A

WO9509266

Publication Title:

Process to improve resistance to stains on yarns and derived products

Abstract:

PCT No. PCT/BE94/00062 Sec. 371 Date Mar. 29, 1996 Sec. 102(e) Date Mar. 29, 1996 PCT Filed Sep. 28, 1994 PCT Pub. No. WO95/09266 PCT Pub. Date Apr. 6, 1995 The invention consists of a process to improve the resistance to stains on yarns, on the basis of wool, silk, polyamide, polyacrylonitrile, natural and artificial cellulosic fibres and in general, all other synthetical fibres which can be dyed. According to the invention the yarns are treated during the dyeing process with an aqueous solution containing up to 5% tannic acid in acid medium. It is economically advisable to add a stabiliser to the solution to avoid oxidation of the solution and the fibres, and possibly a wetting agent. Preferably the treatment is made during the dyeing procedur

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e, before, during or after the effective dyeing step.

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(21) International Application Number: PCT/BE94/00062 (22) International Filing Date: 28 September 1994 (28.09.94) (30) Priority Data: 9301025 30 September 1993 (30.09.93) BE (71) Applicant (for all designated States except US): N.V. DENDERLAND-MARTIN [BE/BE]; Nijverheidslaan 2-4, B-9308 Aalst-Gijzegem (BE). (72) Inventor; and (75) Inventor/Applicant (for US only): DE LATHAUWER, Armand [BE/BE]; S. van der Guchtlaan 9, B-9300 Aalst (BE). (74) Agent: OVERATH, Philippe; Cabinet Bede, Place de l'Alma 3, B-1200 Brussels (BE).		(81) Designated States: AM, AU, BG, BR, CA, CN, CZ, FI, GE, HU, JP, KR, NO, NZ, PL, RO, RU, SI, SK, UA, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i>
(54) Title: PROCESS TO IMPROVE RESISTANCE TO STAINS ON YARNS AND DERIVED PRODUCTS (57) Abstract The invention consists of a process to improve the resistance to stains on yarns, on the basis of wool, silk, polyamide, polyacrylonitrile, natural and artificial cellulosic fibres and in general, all other synthetical fibres which can be dyed. According to the invention the yarns are treated during the dyeing process with an aqueous solution containing up to 5 % tannic acid in acid medium. It is economically advisable to add a stabiliser to the solution to avoid oxidation of the solution and the fibres, and possibly a wetting agent. Preferably the treatment is made during the dyeing procedure, before, during or after the effective dyeing step.		

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DESCRIPTION

Process to improve resistance to stains on yarns and derived products

This invention relates to a process to improve the resistance to stains on yarns on the basis of silk, wool, polyamide, polyester, polyacrylonitrile, natural and artificial cellulosic fibres and in general all other synthetic fibres which can be dyed, by
5 which the resistance of the dyed fibres against stains, especially coloured stains, is increased, whilst at the same time also other improved characteristics are obtained.

By "yarns" has to be understood, yarns whether greige (raw) or processed, yarns unfinished or finished, bright as
10 well as dull, in yarn form or processed to fabric, felt, knitwear, non-woven, carpets, rugs, etc. To simplify matters, in this description yarn in which form whatsoever will be called "substrate".

Removal of stains, coloured or not, from a substrate,
15 is still a very delicate problem, as there could remain traces or spots either by discoloration or coloration of the original substrate caused by the stain or by the detergents which affect the dyestuff of the substrate. This is especially the case for stains caused by products containing persistent dyestuffs or pigments for instance
20 present in coffee, tea, wine, fruit juices, inks...

The purpose of this invention is to propose a process by which the resistance of a coloured or uncoloured substrate against stains of any nature is considerably improved and which at

the same time improves the antistatic behaviour, as well as the resistance to soiling, house-mite and oxidative bleaching agents.

It is known (C.A. Vol. 97 (1982) 7.704 U) that tannin is used to fix dyestuff after the dyeing process. On the other hand it is also known from the swimwear industry, to treat coloured nylon fabric with extractions of gallotannin to improve the colour fastness to chlorine. This was based on the fact that the additional treatment of coloured nylon fabric with gallotannin extractions caused a migration of the dyes in the fibre whereby the gallotannin is fixed on the fibre. This provides a certain resistance to discoloration of the substrate by products containing chlorine. However this treatment has no known effect on coloured stains, and is not at all effective for stains caused by other oxidative bleaching agents.

During extensive research in this field, it has now surprisingly been demonstrated that the resistance of coloured or uncoloured substrate to stains is considerably improved when the substrate is treated during the dyeing process with an aqueous solution containing up to 5% tannic acid by a pH lower than 6.

The term "dyeing process" as used in this description and claims is to be understood in a broad sense and means any or more steps in the sequence of steps applied to a substrate to give this substrate its coloured and finishing characteristics, whereby this sequence of steps can be done in one or more treatments.

It has been found that this treatment is very effective against stains caused by dyes of natural or synthetic origin with anionic, cationic, metalcomplex or disperse nature.

That the tannic acid would improve the discoloration caused by chlorine, could be expected by the man skilled in the art, but that this treatment would be efficient against coloured stains, could not be predicted.

According to the invention, the substrate, in acid medium, is treated with a solution containing 5 to 50 gram tannic acid per litre water and preferably between 25 to 35 g/l.

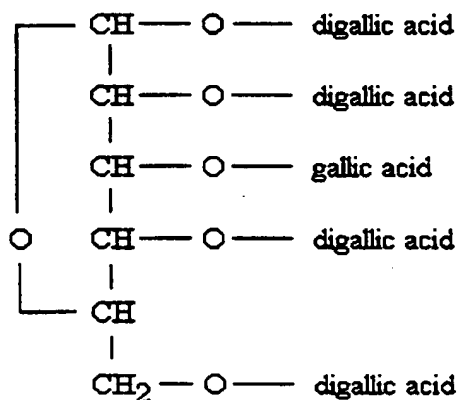
These concentrations and proportions are not critical, though it has been noticed that higher concentrations hardly influence the result but could cause a yellowing of the substrate.

Tannic acid is a compound derived for several centuries from nutgalls and has a structure of polygalloylglucose or polygalloylquinic acid.

The term "tannic acid" as used in this description and claims should be understood in a broad sense, and covers products containing tannic acid, such as for instance gallotannin.

In fact tannic acid is a mixture of compounds consisting of a glucose-chain which is several times substituted with gallic acid or trihydroxy-3,4,5-benzoic-acid-1. Substitution can also be made with digallic acid or with trigallic acid.

Tannic acid e.g. contains nonagalloylglucose, a glucose-chain substituted 5 times with gallic acid, 4 times of which is digallic acid and the formula of which is the following:



According to the invention, any commercial tannic acid can be used, though it is economical to use a tannic acid with a relatively high molecular weight. The molecular weight of the tannic acid will preferably be between 900 and 3500, though this range is not critical.

Surprisingly it has also been found that optimum results are achieved when a mixture of a tannic acid with a relatively low MW and a tannic acid with a relatively high MW is used. So it has been shown that a mixture, consisting of a tannic acid with an average MW lower than 1000 and a tannic acid with an average MW higher than 1500, gives better results than tannic acid of exclusively 1500 MW.

The tannic acid is used in an aqueous solution. For the man skilled in the art, it will be clear that the water has to be de-ironed and softened. To avoid oxidation of the solution, a small quantity of an aliphatic carboxylic acid with a boiling-point lower than 100°C, e.g. acetic acid, can be added.

To avoid oxidation of the substrate, for instance during and after the fixation of the dye, it is also recommended to add a non volatile, non hygroscopic and preferably non corroding acid, as e.g. an aliphatic carboxylic acid such as citric acid or polyacrylic acids. It could also be economical to add a wetting agent, such as e.g. isopropanol.

According to an advantageous embodiment of the invention it is recommended to add a complexing agent to the solution, for instance a polyvalent salt, which can neutralise the free OH groups from the tannic acid. Potassium antimonyl tartrate or alum (aluminium potassium sulphate) can be used for this purpose in a concentration relating to the tannic acid concentration varying between 2/1 to 1/2.

The complexing agent shall preferably be dissolved in water at the ambient temperature and to this solution a non volatile acid, which does not evaporate during steaming of the substrate, can be added. Aliphatic carboxylic acids can be used in a concentration varying between 1 to 10 g per litre water. The solution with complexing agent is added to the tannic acid solution and the mixture should have preferably a pH between 2.5 and 5. If not the pH must possibly be adjusted by adding an acid for instance a sulfamic acid, formic acid, acetic acid... Strong mineral acids have to be avoided.

According to a preferred embodiment of the invention the substrate shall be treated with the tannic acid solution during the dyeing step and can be inserted in a continuous procedure as well as in a discontinuous procedure, and the treatment can be
5 made before, during or after the effective dyeing step.

It is also possible to apply the treatment during a later operation. The dry and dyed substrate can then be treated during a finishing step or in a separate step. It is clear that treatment in a separate step requires an additional operation and is
10 not recommended as a preferred embodiment. In fact such additional step can be useful when basic dyes are used as described hereafter. Nevertheless, treatment with an additional step falls within the scope of the invention.

According to the invention the substrate will be
15 impregnated or saturated with the solution of tannic acid.

The expression "dyeing" is used in this description for any process by which dyes are applied on a substrate, such as dyeing, printing, spacing, spraying, etc... in a single or in multiple steps.

20 The dyes to be applied are dissolved in water, possibly by heating, and afterwards adjusted to the right volume with cold water. The operation will preferably be done in an acid medium.

When applying the dyestuff in a continuous printing
25 process, an acid-resisting thickening agent, such as a hydrocolloid, e.g. Xanthanegum, will be added.

Dyestuffs suitable to be applied according to the invention, are in general acid, metalcomplex as well as disperse dyes. Basic dyestuffs are also suitable, however when using them
30 it is recommended to apply the treatment according to the invention, as an additional treatment.

Also in a differential dyeing or cross dyeing process, when acid and basic dyes are used, it will be recommended to apply the treatment as an additional operation after dyeing.

For the man skilled in the art, it is obvious to select dyestuffs which fit in the described process and do not cause any side-reactions with the applied reagentia and products. Thus when a complexing agent is used, one shall select dyes which are not
5 affected by such agent.

A good pre-selection of dyestuffs will be made through obvious criteria. It can e.g. be useful to select dyestuffs with fast fixing properties.

Below, some dyestuffs that fit in very well in the
10 frame of the invention, are mentioned as non restrictive examples. The dyestuffs are indicated with their corresponding colour index number as it is common practice.

- Acid Yellow 121, 219 and 230.
- Acid Orange 116 and 156.
- 15 • Acid Red 42, 243, 299 and 395.
- Acid Blue 40, 113, 129 and 344.
- Acid Black 172.
- Basic Red 23 and 73.
- Basic Yellow 45 and 63.
- 20 • Basic Blue 45 and 129.
- Mordant Orange 6.
- Disperse Yellow 2.
- Disperse Red 55.1 and 340.
- Disperse Blue 7.

25 Other dyestuffs have also been tested with satisfactory results.

In case of a continuous process, the substrate, after treatment and dyeing, is steamed during a half to a few minutes with airfree saturated steam. After steaming, the coloured
30 substrate is rinsed, preferably with water, at which a stabiliser can be added, preferably a non volatile, non hygroscopic, and non corroding acid, e.g. an aliphatic carboxylic acid, in a concentration e.g. between 0,5 to 5 g/l.

When the treatment solution contains a complexing
35 agent the rinsing will preferably be done with hot water (60°-

90°C), without complexing agent, the rinsing water will be cold water.

In a discontinuous process the tannic acid solution can be added to the dyebath or the treatment can be done in a
5 separate bath.

When a substrate is treated according to one of these embodiments, an unknown resistance to colour stains of natural or synthetic origin containing anionic, cationic, metalcomplex or disperse dyestuffs, is achieved.

10 Stains of coffee at 70°C, kool-aid (highly coloured soft-drink), wine, ink, etc., can easily be removed by wetting the stain with cold or lukewarm water, and dry dabbing.

Tests have been executed with respect to light-fastness, washing-fastness, etc... and showed that the process has
15 no negative influence on the above mentioned fastness properties.

The process and the various ways of applying it is described more in detail below, by way of following non restrictive examples, whereby examples 1 to 5 deal with a treatment during a continuous process, examples 6 to 8 with a treatment during a
20 discontinuous process and examples 9 and 10 relate to an additional treatment.

Example 1

A solution is prepared by dissolving 25 g tannic acid
25 with a MW of 2500 (Mijimoto commercial product) in 1 l of soft water. Then 2 g of a mixture of polyacrylic acids (Eulysine S BASF) and 5 ml acetic acid 80% is added as stabiliser, as well as 5 ml isopropanol as wetting agent. The pH of the solution is 2.5.

A piece of substrate (A) polyamide 6.6 is soaked in
30 this solution at room temperature and squeezed till an uptake equal to 100% substrate.

The wet substrate is printed over with Acid Yellow 230. To this end 1 g of dyestuff is dissolved in 0,1 l of warm water, then cold water is added to 1 l. To this solution, 5 ml
35 acetic acid 80% is added, until a pH of 3.5 is obtained. Finally,

Xanthanegum Type Kelzan is added until the required viscosity is reached.

When the substrate is printed, it is steamed with airfree saturated steam at 98°C during 2 minutes, and then rinsed with cold water. To the rinsing water and/or the last rinsing bath, 2 g of polyacrylic acids (Eulysine S) per litre of water is added. Then the substrate is dried at 100°C.

Comparative trial regarding example 1

A piece of substrate (B) from the same material as substrate (A) is dyed with the same dye solution after it has been moistened with an aqueous solution of acetic acid to which isopropanol was added, but without tannic acid. The coloured substrate was steamed and rinsed in the same way as in example 1, except that the rinsing water did not contain polyacrylic acids.

Substrates A and B were subjected to following tests:

Test 1: coffee test

A cylinder Ø 4 cm and 40 cm high was placed on the substrate. At the bottom of the cylinder, 10 ml of hot coffee at 70°C was injected, whilst on top of the cylinder a weight of 300 g was dropped to press the coffee into the substrate.

The coffee stain was dabbed with hot water (60°C) and dried up with an absorbing tissue. This test was done immediately after applying the stain, on a stain left untouched during two hours and on a stain left untouched during twenty-four hours.

The stain on substrate A disappeared in the three circumstances.

On substrate B, the stain remained visible for about 20% when immediately dabbed with water, but remained for 60% after two hours and for 80% after twenty-four hours. A further treatment with household bleaching water containing 1 g/l active

chlorine was needed to remove the stain. The chlorinated water left a visible pale stain.

Test 2: red wine test

5 With the same testing material as for the test mentioned above, 10 ml of red wine was brought on the substrate and was treated with lukewarm water and dabbed dry, immediately after applying, after two hours and after twenty-four hours.

The results were similar to these of the coffee test.

10 On substrate A, the stain was practically completely removed in the three cases. Treatment with bleaching water containing 0,2 g/l active chlorine could remove the slightly remaining part without effect on the original aspect of the substrate.

15 On substrate B, the stain was only removed for respectively 40%, 30% and 20% and a further treatment with chlorinated water containing 2 g active chlorine was needed, which left a clearly visible pale stain.

Test 3: chlorine test

20 With a pipette, 2 ml of a solution of respectively 1 g/l, 3 g/l and 10 g/l active chlorine was brought on the substrate. After 24 hours the stains were visually evaluated.

25 On substrate A, no discoloration was noticed for 1 g/l and 3 g/l. The solution of 10 g/l had caused a slight discoloration.

On substrate B, there was already a slight discoloration at 1 g/l and a strong discoloration was noticed at 3 g/l. With 10 g/l there was a complete discoloration and the substrate was affected.

30 This test proved that the treatment according to the invention not only protects the colour of the substrate against chlorine, but also gives a protection against the destruction of the substrate itself.

Higher concentrations of chlorine were not tested.

Test 4: repeated stains

The coffee test (test 1) was repeated several times on the same spot of the substrate, and each time, the stain was treated with lukewarm water.

5 On substrate A, the coffee stain disappeared after three times (repeated stains) without leaving any trace. When the stain was made on the same spot for the fourth time, there was a slight discoloration visible after treatment with lukewarm water (85% of the stain could be removed).

10

Test 5: light fastness

A part of substrate A was exposed to light according to the DIN norm 54004, corresponding to ISO norm 105/BO2 (Xenontest).

15 The stain resistance test (test 1) as described above, was done on the exposed part after 24 hours of exposure to light, after 48 hours, after 72 hours... till after 240 hours of exposure.

20 The effectiveness of the stain removing treatment was compared with a non exposed part of substrate A. There was no difference noticed between the non exposed and the part exposed to light, even after 240 hours of exposure.

25 The same test was repeated on substrates A and B and the colour fastness of both substrates was compared after 240 hours of exposure. No colour difference was noticed. Therefore it can be stated that the treatment according to the invention has no negative influence on the colour fastness.

Test 6: shampoo test

30 A part of substrate A was treated with a neutral carpet shampoo (Belgian Norm NBB: G62-014). The shampoo was mixed with water and the foam brought on the substrate with a brush. The shampoo was left to dry on the carpet and then removed with a vacuum cleaner.

After this treatment, test 1 as described above was done on the cleaned part and compared to a part of substrate A not treated with shampoo. No substantial difference was noticed. This shampoo treatment and coffee test was repeated three times and showed that shampoo treatment did not affect the effectiveness of the stain-removing treatment.

Example 2

All steps of example 1 are repeated, but instead of using 25 g tannic acid with a MW of 2500, a mixture of 12,5 g tannic acid with a MW of 900 and 12,5 g tannic acid with a MW of 2500 is used.

Substrate (C) was treated with this solution.

Example 3

A solution is prepared by dissolving 30 g tannic acid with a MW of 2500 in 1 l of cold soft water. Then 5 ml acetic acid 80% is added as stabiliser and 10 ml isopropanol as wetting agent.

A second solution is prepared by dissolving 25 g potassium aluminium sulphate in 1 l of cold soft water. Then 2 g of a mixture of polyacrylic acids (Eulysine S) is added.

Both solutions are mixed together and the pH is adjusted to 2.5 by adding additional polyacrylic acids.

A piece of substrate (D) polyamide 6.6 is soaked in this solution at room temperature and squeezed till an uptake equal 100% to the substrate.

A solution of Acid Blue 129 is prepared by dissolving 1 g of dyestuff in 0,1 l hot water and then adding cold water up to 1 l. To this solution 5 ml acetic acid is added.

The wet substrate is impregnated with the dye solution, then steamed with airfree saturated steam at 98°C during 2,5 minutes, and then rinsed with hot water at 80°C containing 0,5 g/l of a mixture of polyacrylic acids. The pH after rinsing is 6.7. The substrate is then dried at 100°C.

Example 4

The tannic acid solution as in example 2 and the dye solution as in example 3 are mixed together.

Substrate (E) polyamide 6.6 is impregnated with this
5 mixture and then steamed, rinsed and dried as in example 1.

Example 5

Substrate (F) polyamide 6.6 is dyed with the dye solution prepared as in example 3, and steamed and rinsed as in
10 example 1.

The substrate is then squeezed out until a wetness content of about 35%.

The substrate is consequently impregnated with a mixture of tannic acid and complexing agent prepared as in
15 example 3.

Afterwards the substrate is steamed during 30 seconds with airfree saturated steam and dried.

Example 6

20 A substrate (G) polyamide 6.6 with a weight of 840 kg is introduced in a dye beck with winch filled with 20000 l cold soft water (pH = 8.2). The winch is rotated during about 10 minutes to wet the substrate.

A mixture of 6,7 kg tannic acid with a MW of 900 and
25 6,7 kg tannic acid with a MW of 2500 is dissolved in warm water and added to the bath; and dyestuff dissolved in warm water is also added to the bath.

After about 10 minutes rotation of the winch the pH is adjusted to about 6 by addition of acetic acid 80%.

30 The bath is then progressively heated in such a way that the temperature raises about 1°C per minute until about 90°C. This temperature is maintained during about 45 minutes. Then the pH of the bath is lowered to a pH of about 4.5 by addition of citric acid, and the winch is rotated for about 15 minutes. The

bath is then cooled, the substrate is rinsed, taken out from the dye beck and dried.

Example 7

5 A substrate (H) polyamide 6.6 is wetted as in example 6. A dyestuff solution is added to the bath, the pH is adjusted to about 5, and the substrate is dyed by progressive heating as in example 6.

After dyeing during the cooling of the bath at about
10 75°C a solution of tannic acid prepared as in example 6 is added and the pH is adjusted if necessary by the addition of citric acid until pH = 4. The bath is maintained during about 20 minutes at the temperature of 75°C and then cooled. The substrate is consequently rinsed and dried.

15

Example 8

A substrate (K) polyamide 6.6 is wetted and dyed as in example 7 and then rinsed.

The bath is renewed and in a fresh bath a tannic
20 acid solution of composition as in example 6 is added. The pH is adjusted with formic acid until pH = 4. The bath is then heated to about 75°C, kept at this temperature during about 20 minutes and then cooled. The substrate is consequently rinsed and dried.

Example 9

A substrate (L) polyamide 6.6 is treated as in example 5, except that after the dyeing step and the rinsing step the substrate is dried.

In a later step the substrate is further treated with
30 a mixture of tannic acid and complexing agent as in example 5.

Example 10

A substrate (M) polyamide 6.6 is wetted and dyed as in example 6, with a combination of Acid Red 42 and Acid Blue 45

dissolved in warm water (without addition of tannic acid) and the substrate is rinsed and dried.

The substrate is introduced in a fresh bath, containing 2% of a tannic acid with a MW of 900 and the pH is
5 adjusted with formic acid until pH = 4. The bath is then heated to about 65°C, kept at this temperature during about 20 minutes and then cooled. The substrate is consequently rinsed and dried.

It is to be noted that due to the cationic dye, it is recommended to use a lower concentration of tannic acid and to
10 lower the temperature of the bath to about 65° C during the application of the tannic acid.

The coffee test, red wine test and chlorine test as given for example 1 are repeated on each of the substrates C to M
15 and the results are given in table 1 hereafter.

Table 1

Substrate	Coffee test			Red wine test				
	1a	1b	1c	2a	2b	2c	2d	2e
A	100	96	94	95	95	95	0.2	none
C	100	100	96	95	95	95	0.2	none
D	100	100	98	95	95	95	0.2	none
E	100	100	98	95	95	95	0.2	none
F	100	100	100	95	95	95	0.2	none
G	100	98	95	95	95	95	0.2	none
H	100	100	100	95	95	95	0.2	none
K	100	100	100	95	95	95	0.2	none
L	100	100	100	95	95	95	0.2	none
M	100	100	100	95	95	95	0.2	none
B	80	40	20	40	30	20	2	discoloration

1. Coffee test: % of stain disappeared after dabbing with hot water.
 - 1.a stain removed immediately after applying.
 - 1.b stain maintained during 2 hours before removal
 - 1.c stain maintained during 24 hours before removal.
2. Red wine test: % of stain disappeared after dabbing with hot water.
 - 2.a stain removed immediately after applying.
 - 2.b stain maintained during 2 hours before removal.
 - 2.c stain maintained during 24 hours before removal.
 - 2.d concentration of active chlorine (g/l) needed to remove remaining part of stain
 - 2.e effect on original aspect of substrate.

It is obvious that the invention is not restricted to the described examples, but applies for any process by which a

substrate is treated with a tannic acid solution, whereby tannic acid is to be understood in a broad sense, as described hereabove.

Additionally to the described tests, laboratory trials were made with coloured stains originating from different types of drinks and all results showed improved resistance.

Furthermore tests were made with a tannic acid from other suppliers and did not show any difference, so that any available commercial product can be used. The molecular weight however is an important factor, and it is recommended, for economical purposes, to use a mixture of tannic acid with a low MW, and a tannic acid with a high MW. The proportion of both tannic acids is not at all critical, since good results have also been achieved with one type of tannic acid.

It is clear that tannic acid can be combined with other compounds used in the textile industry to seek for additional properties.

The examples were intentionally given with use of an identical substrate so that results could be better compared. As far as the substrate is concerned, polyamide 6.6 was used in the described examples. Other tests with other types of polyamide such as P.A.6 were also made and have given rise to similar results. Tests were furthermore made using wool, cotton, cellulosic artificial fibres, and various other kinds of fibres, and showed that the treatment can be applied on a large variety of substrates.

The concentrations, temperatures and reaction times were determined by the man skilled in the art, according to the used reagentia, products, dyestuffs, production process, type of substrate, etc...

To keep matters simple and in order not to complicate the comparison between the various examples, a mixture of polyacrylic acids was generally used as non volatile acid. It is clear that also the non volatile aliphatic acids can be used.

The same remark stands for the use of acetic acid, that can be replaced by another aliphatic acid with boiling-point under 100°C, and for the use of a wetting agent. Besides

isopropanol, any wetting agent can be applied, provided it does not cause any undesired reaction with tannic acid or the other products used.

CLAIMS

1. Method for improving the resistance to stains of a coloured substrate, made out of fibres, on the basis of silk,
5 wool, polyamide, polyester, polyacrylonitrile, natural or artificial cellulosic fibres or all other synthetic fibres which can be dyed, characterised in that during the dyeing process the substrate is treated in an acid medium with an aqueous solution containing up to 5% of tannic acid.
10
2. Method according to claim 1, characterised in that the substrate is treated during the effective dyeing step.
3. Method according to claim 1 or 2, characterised
15 in that the solution contains 5 to 50 g/l, preferably 25 to 35 g/l tannic acid.
4. Method according to any of the preceding claims 1 to 3, characterised in that the tannic acid is a mixture of tannic
20 acid with relatively low (≤ 1000) molecular weight, and tannic acid with a relatively high (≥ 1500) molecular weight.
5. Method according to any of the preceding claims 1 to 4, characterised in that the pH of the solution ranges between
25 2.5 and 5.
6. Method according to claim 2, characterised in that the substrate is treated with the solution during a continuous or discontinuous dyeing procedure, immediately before, during or
30 immediately after the effective dyeing step.
7. Method according to claim 1, characterised in that the substrate is treated during an additional operation after the substrate has been dyed.

8. Method according to claim 1, characterised in that to the aqueous solution, a stabiliser is added to avoid oxidation of the substrate and the solution, and possibly a wetting agent.

5

9. Method according to any of the preceding claims, characterised in that a complexing agent, such as potassium antimonyl tartrate or aluminium potassium tartrate is added to the tannic acid solution in a concentration relating to the tannic acid concentration varying between 2/1 and 1/2.

10

10. Coloured substrate characterised in that it is treated during the dyeing process with an aqueous solution containing up to 5% tannic acid in an acid medium.

INTERNATIONAL SEARCH REPORT

Inter national Application No
PCT/BE 94/00062

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 D06P1/653

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 D06P

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	EP,A,0 261 637 (GAMBLIN, RODGER L.) 30 March 1988 see page 3, line 10 - line 14 see page 3, line 38 - line 43 ---	1,10
A	DATABASE WPI Section Ch, Week 8343 Derwent Publications Ltd., London, GB; Class D22, AN 83-797483 & JP,A,58 154 772 (DAIWA MARCANT KOGYO) , 14 September 1983 see abstract --- -/--	1

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>DATABASE WPI Section Ch, Week 8638 Derwent Publications Ltd., London, GB; Class A11, AN 86-247834 & JP,A,61 174 485 (KANEBO KK (KANE-) KANEBO RAYON KK (KANE) KANEBO LTD) , 6 August 1986 see abstract</p> <p>-----</p>	1

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COMPOSITION AND METHOD FOR INCREASING WATER AND OIL REPELLENCY OF TEXTILES AND CARPET

Abstract:

Abstract of WO02072942

The invention relates to an exhaustion agent, which is an aqueous emulsion of polymerized monomers, wherein the monomers contain: (meth)acrylic acid (MAA); alkyl (meth)acrylate, such as methyl (meth)acrylate (MMA); and a substituted or unsubstituted styrene; and having an average particle size of the emulsified particles is less than about 220 nm. The figure is a three-dimensional graph of HPLC results obtained from a terpolymer used in a composition of the invention.

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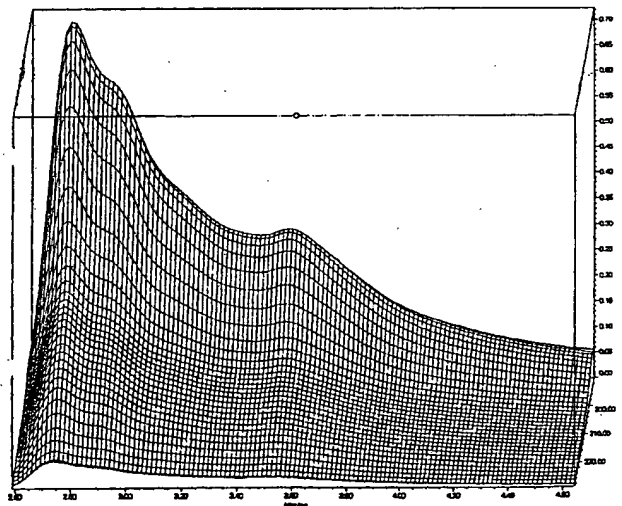
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(57) Abstract: The invention relates to an exhaustion agent, which is an aqueous emulsion of polymerized monomers, wherein the monomers contain: (meth)acrylic acid (MAA); alkyl (meth)acrylate, such as methyl (meth)acrylate (MMA); and a substituted or unsubstituted styrene; and having an average particle size of the emulsified particles is less than about 220 nm. The figure is a three-dimensional graph of HPLC results obtained from a terpolymer used in a composition of the invention.

WO 02/072942 A1

COMPOSITION AND METHOD FOR INCREASING WATER AND OIL REPELLENCY OF TEXTILES AND CARPET

5 BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to compositions and methods for increasing the water and oil repellency of fibers in textiles, in particular in upholstery textiles, and in carpet and other floor coverings. More particularly, the invention relates to compositions containing
10 terpolymers and fluorochemical compounds that impart strong water and oil repellency to textiles and carpet fibers, and that have good durability to shampooing or other cleaning processes.

2. Description of Related Art

Fluorinated carbon compounds have been used extensively to impart water and oil
15 repellency to textile and carpet fibers. Part of their desirability for this use stems from their ability to provide both oil and water repellency simultaneously, unlike waxes, silicones, etc., which typically provide water repellency, but are somewhat oleophilic, and thus do not provide good oil repellency. Fluorinated or perfluorinated alkyl compounds, when applied to fibers in sufficient amount, lower the surface tension of the fiber or fabric
20 below the surface energy of water or oils that might be spilled onto the fabric. This allows these liquids to be removed before they can penetrate into the fabric or fiber. Obviously, this is of great benefit for fibers and fabrics that are used in residential, commercial, and industrial settings, since the useful life of the fabric or fibers is substantially increased, as is their aesthetic value.

25 Fluorinated hydrocarbons have been predominantly made by two methods. Electrofluorination has been used by 3M Corporation and by Dainippon Ink Chemicals to directly perfluorinate a sulfonated hydrocarbon with hydrofluoric acid, ultimately producing a perfluorinated sulfonamide. This method has fallen into disfavor for environmental and health reasons. Specifically, certain of the intermediates of this
30 process have been found to be extremely bioaccumulative.

Telomerization of tetrafluoroethylene or other fluorinated monomers, used by Asahi Glass, Atochem, Daikin, DuPont, and Clariant, has been used to produce a range of fluoroalkyl products. The telomerization process is becoming a preferred technique for

producing fluorinated compounds because it does not implicate the same environmental and health concerns as the electrofluorination process.

Along with the increasing popularity of fluorochemicals produced by telomerization, there has been an increasing desire to provide telomeric fluorochemical compositions that are highly exhaustible onto nylon and other fibers of carpets and textiles. This allows these compositions to be applied in an exhaust bath, such as during dyeing, prior to sale to consumers. This, in turn, reduces or eliminates the need for purchasers and mill workers to be exposed to aerosolized fluorochemicals, and avoids the need for the surfactants typically required for foam application. It also provides for better penetration of the fiber by the fluorochemical.

One method for exhaust application of fluorochemicals onto carpet fiber has been described in U.S. Patent No. 5,520,962, the entire contents of which are hereby incorporated by reference. In this patent, fluorochemicals are combined and applied with a particular type of stain-resist composition, which is described as "an anionic polymer binding compound" that is alleged to improve the performance of the fluorochemical, possibly by holding the fluorochemical to the surface of the fiber. However, even with the use of "anionic polymer binding compounds," the process disclosed in the '962 patent does not achieve the high exhaustion levels desired in the industry, and economically necessary in order to reduce waste of expensive fluorinated reagents.

In addition, there is a need for compositions that are durable, at least in the sense that the treated fibers retain a significant portion of their repellency after shampooing. In particular, shampooing using commonly available, off-the-shelf carpet or fabric shampoos, which are often highly alkaline, can cause drastic decreases in oil or water repellency, as the fluorine-containing film is washed off of the fibers or fabric along with the soil. The repellency system described in the '962 patent does not achieve a fluoropolymer treatment having durability levels sufficient to withstand shampooings using alkaline carpet or textile cleaning shampoos.

A composition or treatment method that meets both of these needs would decrease the amount of fluorine that is consumed during the treatment process, significantly decreasing the cost of the fabric, fiber, or process.

Finally, there is a need to provide a fluorochemical composition that has the above properties, and is also storage stable, i.e., does not undergo gelation or phase-separation over time.

5

SUMMARY OF THE INVENTION

This invention satisfies the needs described above by providing an exhaustion agent that can be incorporated into a stable, emulsion polymerized, repellency composition. This composition is highly exhaustible onto nylon and other fabrics, deposits a high level of fluorine onto the fibers, and is highly durable to shampooing or
10 other cleaning treatments.

In one embodiment, the invention relates to an exhaustion agent, which is an aqueous emulsion of polymerized monomers, wherein the monomers contain:

(meth)acrylic acid (MAA);
alkyl (meth)acrylate, such as methyl (meth)acrylate (MMA); and
15 a substituted or unsubstituted styrene;
and wherein the average particle size of the emulsified particles is less than about 220 nm. A stable emulsion that does not undergo phase separation or gelation, and that has the requisite particle size has not been described in the patents referenced herein.

In another embodiment, the invention is a repellency enhancing composition
20 containing a blend of a fluoropolymer, the exhaustion agent described above, and an optional hydrotrope. This composition has been found to provide theoretical or near theoretical exhaustion of fluorine onto fibers and fabrics, and the resulting oil and/or water repellency has been found to be excellent and very resistant to shampooing.

In another embodiment of the invention, the composition contains the above-
25 described terpolymer of an MAA component, an MMA component, and a styrene component, but the terpolymer is prepared by emulsion polymerization in the presence of the fluoropolymer. While not wishing to be bound by any theory, it is believed that the terpolymer and fluoropolymer become associated, possibly by formation of an interpenetrating polymer network, and/or by other mechanisms, resulting in a high level
30 of physical affinity of the terpolymer for the fluoropolymer, and conversely. Irrespective of mechanism, the combination of terpolymer exhaustion agent and fluoropolymer prepared in this manner are highly effective in exhausting theoretical or near theoretical

levels of fluorine onto fibers or fabrics, and the resulting oil/water repellent materials have excellent durability to shampooing, as described above.

In yet another embodiment of the invention, the composition contains a polymer prepared by polymerizing the monomers of the terpolymer, in the presence of a fluoromonomer. The resulting polymer exhausts fluorine onto the fiber or fabric without any need for interaction with a separate fluoropolymer, since a single polymer provides both exhaustibility and fluorine for repellency.

The compositions of the invention provide stable fluorochemical emulsions that are highly exhaustible onto fibers and fabrics, in some cases achieving exhaustion levels of 95% to 100% of theoretical, and providing a high level of fluorine on the fiber surface, and thus providing excellent water and oil repellency. The resulting oil and water repellency provided by these compounds continues after shampooing, even with alkaline carpet or upholstery shampoos.

BRIEF DESCRIPTION OF DRAWING

FIG. 1 is a three-dimensional graph of HPLC results obtained from a terpolymer used in a composition of the invention.

DETAILED DESCRIPTION OF SPECIFIC EMBODIMENTS

The exhaust agents and compositions of the invention can be used with a number of different fibers and fabrics prepared from the fibers. Suitable fibers include those extruded from synthetic materials include polyamides, such as nylon 6 and nylon 6,6, polyolefins, such as polypropylene, and polyesters, as well as natural fibers, such as wool or cotton.

The exhaust agents of the invention are generally in the form of emulsions, and generally have been prepared by an emulsion polymerization of an MAA component, an MMA component, and a styrene component. Either methacrylic acid or acrylic acid, or mixtures thereof, may be used as the MAA component. Similarly, methyl, ethyl, propyl, and other esters of methacrylic or acrylic acid, and mixtures thereof, may be used as the MMA component. The styrene component may be styrene per se, or may be styrene substituted with, e.g. sulfonate, phosphonate, carboxylate or hydrocarbyl groups.

Methacrylic acid, methyl methacrylate, and unsubstituted styrene have been found to perform well when emulsion polymerized to form the exhaustion agent.

The MAA component is generally present in an amount ranging between about 20 wt% and about 80 wt%, more particularly about 30 wt% to about 80 wt%, based on the total polymerized monomers in the polymerization mixture. The styrene component is generally present in an amount ranging from about 20 wt% to about 80 wt%, more particularly, from about 20 wt% to about 60 wt%, based on the total polymerized monomers in the polymerization mixture. The MMA component is generally present in an amount ranging from about 5 wt% to about 80 wt%, more particularly from about 5 wt% to about 30 wt%, based on the total polymerized monomers in the polymerization mixture.

In addition to the three monomers described above, the reaction mixture can typically contain emulsifying agents, such as Biosoft D-40, in amounts ranging from about 0.1 wt% to 1.0 wt%, based on the total reaction weight ; chelating agents, such as EDTA, Versene 100, etc., present in amounts ranging from about 0.01 wt% to about 0.05 wt%, based on the total reaction weight ; a redox activator, such as ferrous sulfate, present in amounts ranging from about 0.01 wt% to about 0.05 wt %, based on the total reaction weight ; oxidizing agents, such as ammonium persulfate (AMPS) and dibenzoyl peroxide, present in amounts ranging from about 0.01 wt% to about 0.20 wt% ,based on the total reaction weight ; reducing agents such as sodium hydrosulfite and sodium metabisulfite (SMBS) present in amounts ranging from about 0.01 wt% to about 0.20 wt%, based on the total reaction weight .

The monomers described above are emulsion polymerized in the presence of an emulsifying agent, such as Biosoft D-40, and redox initiators, such as AMPS and SMBS. Typically, the monomers are combined with water under agitation and, desirably, nitrogen sparging, along with the emulsifying agent, an optional chelating agent, such as EDTA, a reducing agent such as sodium hydrosulfite, and an optional redox activator such as ferrous sulfate. Free radical initiators, such as benzoyl peroxide may also be added, but are not strictly necessary. The redox initiators are added, typically as aqueous solutions, and an exothermic reaction proceeds, which generally raises the temperature of the reaction mixture from room temperature to 40-50 °C. Cooling can be used to control the exotherm, but is not strictly necessary. The reaction is generally allowed to proceed

for several hours until monomer conversion is complete, and can be quenched of excess reducing agent by addition of hydrogen peroxide. It has generally been found to be desirable to add all the emulsifying agent with the monomers, and to add additional water to the reaction mixture, as this can prevent the mixture from becoming too viscous, and provides a more desirable particle size. It is also desirable to add the redox initiators in solutions having concentrations ranging from about 10 g/l to about 400 g/l, and to add them gradually, or in several portions over the course of the reaction.

The emulsion polymerization typically produces emulsions having solids contents ranging from about 10 wt% to about 20 wt%, more particularly from about 11 wt% to about 18 wt%, more particularly from about 12-13 wt%. The emulsions typically have an average particle size that is less than about 220 nm, more particularly ranging from about 100 nm to about 200 nm, typically having a standard deviation ranging from about 40 nm to about 70 nm, more particularly from about 45 nm to about 55 nm.

The emulsion polymer formed by this process provides an exhaustion agent that substantially increases the level of exhaustion of fluoropolymers onto fabrics and fibers, yielding increased efficiency, decreased cost (since smaller amounts of expensive fluoropolymers are required to get the same level of oil and water repellency), and increased durability of repellency, as shown in more detail below.

The exhaustion agent described above can be blended with fluoropolymers prepared either by electrofluorination or by telomerization, but have been found to be particularly suitable for use with telomerized fluoropolymers. Any telomerized fluoropolymers can be combined with the exhaust agent to form an exhaustible composition according to the invention, including those produced by Asahi Glass, Atochem, Daikin, such as Daikin 3310 or 3311, Dupont, such as Dupont Tufcoat (Anionic), and Clariant, such as the NUVA fluoropolymers, such as NUVA CPA, NUVA 5006, and Peach State Labs, such as Myafax WS.

The exhaustion agent and fluoropolymer can also be desirably combined with a hydrotrope, such as a solution of dodecyldiphenyloxide disulfonic acid, e.g. a 40 wt% solution obtained by diluting DBA-70 (70 wt% dodecyldiphenyloxide disulfonic acid), Pilot Corporation, with water. This helps the fluoropolymer and exhaustion agent to form a stable emulsion that does not undergo phase separation or gelation over time.

Desirably, these components are combined into an aqueous solution by blending them with water to form a suspension having a solids content ranging from about 10 wt% to about 20 wt%.

The resulting blended exhaustible composition can be applied as a composition
5 having from about 0.7 g/l to about 6.0 g/l of the exhaustion agent, and about 0.5 g/l to about 1.5 g/l of fluoropolymer to fibers and/or fabrics at a rate ranging from about 10 % to about 450 % wet pick up. The fibers or fabrics may be dyed or otherwise treated, and are immersed in the exhaustible composition at a temperature ranging from about 20 to about 100 °C. The fabrics are thoroughly soaked with the exhaustible composition at a
10 pH of about 2-4 (the pH of the solution can be adjusted using, e.g., urea sulfate or urea hydrochloride, as well as other known pH adjusting agents), and desirably steamed for about 0.5 to about 2.0 minutes, rinsed, extracted (so that excess liquid is removed from the fiber or fabric), and dried at a temperature ranging from 80 to about 130°C. The treatment may be conducted in the dyebath, or as a separate process step occurring prior
15 to or after drying.

The exhaustible composition has, as one embodiment, the blend described above. In another embodiment, the polymerization of the MAA, styrene, and MMA components can be conducted in the presence of the fluoropolymer, which is added to the reaction mixture prior to polymerization. Desirably, the fluoropolymer is added to the reaction
20 mixture prior to the addition of redox initiators. Any of the fluoropolymers described above for use in the blended exhaustible composition can be used in this embodiment, and the amounts added are similar to those described above with respect to the blended exhaustible composition. Myafax WS (fluoropolymer, Peach State Labs) has specifically been found to be suitable. Other than adding fluoropolymer to the reaction mixture prior
25 to initiator addition, this embodiment does not require any significant departure from the procedure described above for the blended composition. While not wishing to be bound by any theories, it is believed that the polymerization of the MAA, styrene, and MMA components in the presence of fluoropolymer results in a close association of these materials, such as in an interpenetrating polymer network (IPN) or other association.
30 This association is believed to contribute to the near theoretical exhaustion of fluoropolymer onto the fibers or fabrics.

The methods of applying these compositions to fabrics or fibers does not depart significantly from that disclosed herein for the blended exhaustible compositions.

In yet another embodiment of the invention, the MAA, styrene, and MMA components of the emulsion polymer can be polymerized in the presence of fluoromonomer. While virtually any fluoromonomer can be used, those having a perfluoroalkyl moiety, a linking moiety (such as a carboalkoxy group), and a film forming moiety (such as an unsaturated hydrocarbyl group) have been found to be particularly suitable. Examples of suitable fluoromonomers include those produced by Clariant under the Fluowet EI, Fluowet EA, Fluowet ET, Fluowet AC, and Fluowet MA tradenames. Fluowet MA 812, which has the telomer distribution shown below, has been found to be particularly suitable.

$\Sigma R_F C_2 H_4 OCOC(CH_3)=CH_2$	>90.0
$\Sigma R_F C_4 H_8 OCOC(CH_3)=CH_2$	<3.0
$\Sigma R_F C_2 H_4 OH$	<3.0
$C_6 F_{13} C_2 H_4 OCOC(CH_3)=CH_2$	<5.0
$C_8 F_{17} C_2 H_4 OCOC(CH_3)=CH_2$	50-60
$C_{10} F_{21} C_2 H_4 OCOC(CH_3)=CH_2$	20-28
$>C_{12} F_{25} C_2 H_4 OCOC(CH_3)=CH_2$	8-15

In polymerizing the components of this reaction mixture, no significant departures are necessary from the general procedure described above with respect to preparing the exhaustion agent for the blended exhaustible composition, other than adding the fluoromonomer to the reaction mixture, desirably before addition of the redox initiators. Generally, the fluoromonomer is added in amounts ranging from about 15 wt% to about 70 wt%, based on polymer solids.

Similarly, application rates and methods do not differ significantly from the general procedures described above. While not wishing to be bound by any theory, it is believed that the fluoromonomers become closely associated with the polymer forming the exhaustion agent, either through incorporation into the polymer chain, or by some other mechanism, resulting in extremely high, near theoretical, exhaustion of fluorine onto the fibers or fabrics.

EXAMPLES

In the examples below (which merely illustrative, and are not intended to limit the scope of the claimed invention), oil and water repellency of various compositions is

evaluated using a Dupont ZEPEL/TEFLON Specification Test Kit. This technique, recognized in the art, evaluates the repellency of a material to liquids that are progressively more "wetting." The contact angle of the liquid is measured after 30 seconds (oil) or 10 seconds (water), and a score assigned based whether the liquid wets the material. For example, a material that is wetted by n-tetradecane but not by n-hexadecane would be rated "3" for oil repellency. The ratings and liquids are set forth in the tables below, along with the surface tensions of some of the liquids. The surface tension of pure water is about 72 dyne/cm, and that of pure isopropanol is about 22 dyne/cm, so the surface tensions of mixtures used in the water repellency tests will be between these values.

Oil rating number	Liquid	Surface Tension (dyne/cm)
1	Nujol/Kaydol	32
2	65/35 Nujol/n-hexadecane	
3	n-hexadecane	27
4	n-tetradecane	26
5	n-dodecane	25

Water rating number	Liquid
1	2% aq. Isopropanol
2	5% aq. Isopropanol
3	10% aq. Isopropanol
4	20% aq. Isopropanol
5	30% aq. Isopropanol

EXAMPLE 1

An emulsion polymer was prepared by combining 137 g MAA, 53 g styrene, and 1 g MMA in 819.7 cc deionized water, 63 g Biosoft D-40 (sodium dodecylbenzenesulfonate) at a temperature of 21 °C. To this mixture were added 6 g ammonium persulfate (AMPS, 25% solution) and 4 g sodium metabisulfate (SMBS, 20% solution), in aliquots over the first 30 minutes of reaction time. An additional 3 g AMPS and 2 g SMBS were added after about another 15 minutes of reaction time, and about 0.2 g ferrous sulfate was added shortly thereafter. An exotherm was noted, and mixture was reacted for about 1 hour reaction time, and allowed to cool. The result was a very viscous liquid having a solids content of about 18.6%.

EXAMPLE 2

60 parts-by-weight of the liquid of Example 1 was combined with 25 pbw water, 13 pbw Daikin 3310 (Daikin, fluoropolymer), and 2 pbw of a 40% solids content solution of dodecyldiphenyloxide disulfonic acid (obtained by diluting DBA-70, Pilot Corporation, with water). The result was a stable emulsion that did not undergo gelation or phase separation.

EXAMPLE 3

60 parts-by-weight of the liquid of Example 1 was combined with 25 pbw water, 13 pbw Daikin 3311 (Daikin, fluoropolymer), and 2 pbw of a 40% solids content solution of dodecyldiphenyloxide disulfonic acid (obtained by diluting DBA-70, Pilot Corporation, with water). The result was a stable emulsion that did not undergo gelation or phase separation.

EXAMPLE 4

60 parts-by-weight of the liquid of Example 1 was combined with 24 pbw water, 13 pbw Nuva CPA (Clariant, fluoropolymer), and 3 pbw of a 40% solids content solution of dodecyldiphenyloxide disulfonic acid (obtained by diluting DBA-70, Pilot Corporation, with water). The result was a stable emulsion that did not undergo gelation or phase separation.

EXAMPLE 5

60 parts-by-weight of the liquid of Example 1 was combined with 19 pbw water, 15 pbw Tufcoat Anionic (DuPont, fluoropolymer), and 6 pbw of a 40% solids content solution of dodecyldiphenyloxide disulfonic acid (obtained by diluting DBA-70, Pilot Corporation, with water). The result was a stable emulsion that did not undergo gelation or phase separation.

EXAMPLE 6

60 parts-by-weight of the liquid of Example 1 was combined with 23 pbw water, 13 pbw Nuva 5006 (Clariant, fluoropolymer), and 4 pbw of a 40% solids content solution of dodecyldiphenyloxide disulfonic acid (obtained by diluting DBA-70, Pilot Corporation, with water). The result was a stable emulsion that did not undergo gelation or phase separation.

EXAMPLE 7

2.1920 kg MAA were combined with 848.0 g styrene, 160.0 g MMA, 100.8 g Biosoft D-40, and 11.782 kg deionized water, with agitation. 69.0 g AMPS and 46.0 g

SMBS were added after 30 minutes. 1.6 g FeSO_4 in 683 g water was added after 45 minutes under high agitation. The mixture formed a thick, paste-like mass (coagulum), which became less viscous on further agitation.

EXAMPLE 8

5 382.4 g tap water was combined with 2.0 g Biosoft D-40, 0.2 g Versene 100, 68.5 g MAA, 26.5 g styrene, 5.0 g MMA, 0.1 g benzoyl peroxide, and 0.1 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ at 24 °C with agitation and under nitrogen sparging. N_2 sparging was discontinued after thirty minutes, and 0.2 g sodium hydrosulfite was added (in 5.8 g water). At 1.5 hours, 0.2 g AMPS (in 5.8 g water) was added. After 1 hour, 50 minutes, 0.2 g AMPS, 0.2 g
10 SMBS, and 0.1 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$, each (in 5.8 g water) were added. After 2 hours reaction time, an additional 1 g Biosoft D-40 was added. By 3 hours, the mixture had cooled from a high temperature of 45 °C to 25 °C, and was a thick liquid. It was diluted with 250 g water to provide an emulsion having a solids content of 12.5 wt%, a pH of 3.05, a viscosity of 40 cps (21 °C, #1 spindle viscometer @ 30 rpm), and an average particle size
15 of 184 nm (Coulter N4 MD submicron particle size analyzer).

EXAMPLE 9

991.0 g water was combined with 5.2 g Biosoft D-40, 0.6 g Versene 100, 177.6 g MAA, 68.6 g styrene, 13.0 g MMA, 0.4 g benzoyl peroxide, and 0.4 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (in 9.6 g water) under agitation and N_2 sparging. After 30 minutes, 0.5 g sodium hydrosulfite
20 (in 9.5 g water) was added, and N_2 sparging discontinued. After 40 minutes, 0.6 g AMPS (in 9.4 g water) was added. After 1 hour, 10 minutes, another 0.4 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (in 9.6 g water) was added, followed by 0.6 g SMBS (in 94 g water) and another 0.6 g AMPS (in 9.4 g water). At 1 hour, 15 minutes, 370.2 g water was added, then another 2.6 g Biosoft D-40, then another 370.2 g water. The resulting emulsion contained 12.0 wt%
25 solids (93 % of theoretical), had a viscosity of 14 cps (24 °C, #1 spindle, 30 rpm), and a particle size of 174 nm.

EXAMPLE 10

382.4 g tap water was combined with 2.0 g Biosoft D-40, 0.2 g Versene 100, 68.5 g MAA, 26.5 g styrene, 5.0 g MMA, 0.1 g benzoyl peroxide, and 0.1 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ at
30 24 °C with agitation and under nitrogen sparging. N_2 sparging was discontinued after thirty minutes, and 0.1 g sodium hydrosulfite was added in 5.8 g water. At 1 hour, another 0.1 g sodium hydrosulfite was added in 5.8 g water. At 1 hour, 10 minutes, 0.2 g

AMPS in 5.8 g water was added. After 1 hour, 30 minutes, 0.2 g AMPS, 0.2 g SMBS, each in 5.8 g water, were added. After 1 hour, 50 minutes, 0.1 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (in 5.8 g water) was added. After 2 hours 10 minutes reaction time, an additional 1 g Biosoft D-40 in 161 g water was added. By 2 hours, 45 minutes, the mixture had cooled from a high temperature of 42 °C to 30 °C, when 1 ml of hydrogen peroxide was added to quench any SMBS. It was an emulsion having a solids content of 15.5 wt%, and an average particle size of 154 nm.

EXAMPLE 11

10.949 kg tap water was combined with 70.4 g Biosoft D-40, 4.0 g Versene 100, 1.603 kg MAA, 620.8 g styrene, 116.8 g MMA, 3.2 g benzoyl peroxide, and 3.2 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (dissolved in water) under agitation, with N_2 sparging at 19 °C. After 30 minutes, 4.8 g sodium hydrosulfite (dissolved in water) was added. After 40 minutes, 4.8 g AMPS (dissolved in water) was added. After 1 hour, 10 minutes, 1.6 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ (dissolved in water) was added, followed by 2.4 g AMPS, also dissolved in water. At 1 hour, 50 minutes, an additional 2.4 g AMPS and 2.4 g SMBS were added, both dissolved in water. 5.51 kg water was added, to provide a suspension having 12.3 wt% solids and an average particle size of 124 nm.

EXAMPLE 12

11.55 kg water, 71 g Biosoft D-40, 4 g Versene 100, 1.603 kg MAA, 621 g styrene, 117 g MMA, 3.2 g benzoyl peroxide, and 3.2 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ were combined (the styrene, MMA, and benzoyl peroxide were added together) at 21 °C with agitation (138 RPM) under N_2 sparging. After 30 minutes, 4.8 g sodium hydrosulfite dissolved in 50 g water was added, and 4.8 g AMPS dissolved in 50 g water was added 10 minutes after the AMPS. After 1 hour, 10 minutes, 1.6 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ dissolved in 50 g water was added. 5 minutes later, 2.4 g AMPS dissolved in 50 g water was added. After 1 hour 40 minutes, an additional 2.4 g AMPS dissolved in 50 g water and 2.4 g SMBS dissolved in 50 g water were added. At 1 hour 50 minutes, 1.525 kg water was added, and at 2 hours, 20 minutes, an additional 3.744 kg water was added. The resulting emulsion had a solids content of 11.8 wt% and an average particle size of 130 nm.

EXAMPLE 13

10.948 kg water, 71 g Biosoft D-40, 4 g Versene 100, 1.603 kg MAA, 621 g styrene, 117 MMA, and 3.2 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in 100 g water were combined at 18 °C under

agitation (150 RPM) with N₂ sparging. After 30 minutes, 4.8 g sodium hydrosulfite in 50 g water were added, and sparging discontinued. After 40 minutes, 4.8 g AMPS in 50 g water were added. After 1 hour, 10 minutes, 1.6 g FeSO₄•7H₂O in 50 g water were added, followed by 2.4 g AMPS in 50 g water. After 1 hour, 40 minutes, 2.007 kg water were added, followed by 2.4 g AMPS in 50 g water, and 2.4 g SMBS in 50 g water. After 2 hours, 20 minutes, another 3.739 kg water was added. The resulting emulsion had a solids content of 12.5 wt% and an average particle size of 127 nm. A three-dimensional graph of the HPLC absorbance is shown in FIG. 1.

EXAMPLE 14

356.9 g water, 2.4 g Biosoft D-40, 0.1 g Versene 100, 22.9 g MAA, 49.6 g styrene, 3.8 g MMA, and 0.1 g FeSO₄•7H₂O in 3.3 g water were combined with agitation under N₂ sparging. After about 30 minutes, 0.2 g sodium hydrosulfite in 1.6 g water was added, followed by 0.2 g AMPS in 1.6 g water. The agitation was increased, and after 1 hour 10 minutes, 0.05 g FeSO₄•7H₂O in 1.6 g water was added, followed by 0.1 g AMPS in 1.6 g water. After 1 hour, 50 minutes, 65.4 g water was added, followed by 0.1 g AMPS in 1.6 g water and 0.1 g SMBS in 1.6 g water at 2 hours. After 2.75 hours, another 85.1 g water was added. The reaction was stopped by adding 2.0 g hydrogen peroxide at 3.25 hours. The resulting emulsion had a solids content of 12.5 wt% and an average particle size of 196 nm.

EXAMPLE 15

356.9 g water, 2.4 g Biosoft D-40, 0.1 g Versene 100, 15.3 g MAA, 61.0 g MMA, and 0.1 g FeSO₄•7H₂O in 1.6 g water were combined at 20 °C under agitation and N₂ sparging. After 30 minutes, 0.2 g sodium hydrosulfite in 1.6 g water was added and sparging discontinued. This was followed by 0.2 g AMPS in 1.6 g water. After about 53 minutes of reaction time, 65.4 g water was added, followed by another 85.1 g water at 1 hour, 5 minutes. At 1.25 hours, two aliquots of 0.1 g AMPS in 1.6 g water were added, along with 0.1 g SMBS in 1.6 g water. At 1.75 hours, 2.0 g hydrogen peroxide were added to stop the reaction. The resulting emulsion had a particle size of 388 nm and a solids content of 12.4 wt%.

EXAMPLE 16

507.4 g water, 2.4 g Biosoft D-40, 0.1 g Versene 100, 61.0 g MAA, 15.3 g MMA, and 0.1 g FeSO₄•7H₂O in 3.2 g water were combined at 21 °C under agitation and N₂

sparging. After 30 minutes, 0.2 g sodium hydrosulfite in 1.6 g water was added, followed by 0.3 g AMPS in 3.2 g water. After 1 hour, 10 minutes reaction time, 0.1 g AMPS in 1.6 g water and 0.1 g SMBS in 1.6 g water were added. The resulting emulsion had a particle size of 211 nm and a solids content of 12.7 wt%.

5 EXAMPLE 17

The emulsions of Examples 13, 14, 15, and 16 were formulated with Daikin 3310 fluoropolymer to form the blends indicated below and applied to a BASF Type 6 nylon tube that had been mock dyed by applying a 2 g/l solution of Isotac ACD at pH 6.0 at a rate of 350 % wet pick up, steaming the tube for 3 min. in a vertical steamer, rinsing,
10 extracting excess liquid to 80 % wet pick up. The blends were applied as 5 g/l solutions at 350 % wet pick up at pH 2.3 (maintained by adding urea sulfate as a pH adjuster), and the tubes were steamed for 45 sec in a vertical steamer, rinsed, extracted, and dried at 190 °F until dry. A piece of each tube was then tested for oil and water repellency using the DuPont ZEPEL/TEFLON Specification Test Kit, and for fluorine content using the
15 combustion method (DuPont TM 0371-86). The remaining portion of the tube was then shampooed at 160 °F for 1 min. at a 10:1 liquor ratio in a 16.0 g/l solution of RUG DOCTOR Steam Cleaning Solution, rinsed, extracted, and dried. A piece of this shampooed tube was also tested for oil and water repellency and fluorine content using the test methods described above. The results are provided in the Table below. The
20 theoretical ppm fluorine for 100% exhaustion of the emulsions tested is 240 ppm.

Blend	Example No.	Weight Ratio ¹	Water Repellency ²	Oil Repellency ³	Fluorine Content ⁴	Water Repellency ⁵	Oil Repellency ⁶	Fluorine Content ⁷
1	No after-treatment	--	0	0	0	0	0	0
2	Daikin 3310, water	13:87	5	5	175	4	3	120
3	13	13:2:60:25	5	5	207	5	5	200
4	14	13:2:60:25	5	4	228	5	4	217
5	15	13:2:60:25	3	2	50	3	0	40
6	16	13:2:60:25	5	4	205	4	3	151

¹ The weight ratio of Daikin 3310 fluoropolymer to water in Blend 2 (control). The weight ratio of Daikin 3310:Dodecyl/diphenyl oxide disulfonic acid (40 wt% solution):exhaustion agent:water in Blends 3-6.

² Before shampooing.

³ Before shampooing.

⁴ In ppm, before shampooing.

⁵ After shampooing.

⁶ After shampooing.

⁷ In ppm, after shampooing.

EXAMPLE 18

111.72 g deionized water, 120 g of 40 wt% sodium xylene sulfonate aqueous solution (SXS), 2.52 g Biosoft D-40, 100 g Myafax WS fluoropolymer, 41.10 g MAA, 15.9 g styrene, and 3.0 g MMA were combined under agitation at 23 °C. 3.5 g AMPS and 2.3 g SMBS were added, followed by 0.20 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$. The temperature of the mixture began to increase, and the viscosity increased as well, but then decreased. After about 3.5 hours of reaction time, the resulting emulsion was tested by applying (at a rate of 350% wet pick up) a 9 g/l solution to a BASF Type 6 nylon sock, steamed for 45 s in a vertical steamer, rinsed, extracted, and dried, and showed good water repellency (5) when tested using a DuPont ZEPEL/TEFLON Specification Test Kit.

EXAMPLE 19

150 g of 40 wt% SXS, 3.15 g Biosoft D-40, 125 g Myafax WS fluoropolymer, 34.25 g MAA, 13.25 g styrene, 2.50 g MMA, and 170.85 g deionized water were combined at 21 °C under agitation. 0.50 g AMPS and 0.50 g SMBS, followed by 0.18 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ were added. The emulsion was reacted for about 2.25 hours. The resulting product had a fluorine content of 2.05 %. A 7 g/l solution was applied to a BASF Type 6 nylon sock at 350% wet pick up, steamed for 45 seconds in a vertical steamer, rinsed, extracted, and dried. It showed good water repellency (5) and good oil repellency (4) when tested using a DuPont ZEPEL/TEFLON Specification Test Kit. The exhausted fluorine on the fabric was 485 ppm out of 502 ppm theoretical.

EXAMPLE 20

35.0 g MAA, 10.0 g styrene, 5.0 g MMA, 50.0 Fluowet MA-812 (Clariant fluoromonomer), 2.0 g Biosoft D-40, 382.4 g tap water, 0.2 g Versene 100, 0.2 g $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ in 5.8 g water, 0.1 g benzoyl peroxide, and an additional 1.0 g Biosoft D-40 were combined at 20 °C under agitation and N_2 sparging. After 30 minutes, sparging was discontinued and 0.4 g sodium hydrosulfite in 11.6 g water was added, followed by 0.28 g AMPS in 5.8 g water. After 1 hour, 10 minutes, another 0.2 g AMPS in 5.8 g water and 0.2 g SMBS in 5.8 g water were added, along with another 100 g water. After 1.5 hours, 60.0 g water and 1 g hydrogen peroxide were added. The resulting emulsion had a fluorine content of 4.6 %, and was applied as a 3 g/l solution to a BASF Type 6 nylon sock at 350% wet pick up. The sock material was steamed, rinsed, extracted, and dried. Testing using a using a DuPont ZEPEL/TEFLON Specification Test Kit gave good water

repellency (5) and good oil repellency (5). The exhausted fluorine on the fabric was 475 ppm out of 483 ppm theoretical.

COMPARATIVE EXAMPLE 1

The procedure followed is that described in part A of Example 1 of U.S. Patent No. 4,081,383 (the entire contents of which patent are hereby incorporated by reference).

The following components were mixed under agitation:

COMPONENT	PARTS BY WEIGHT
Water	385.11
Biosoft D-40 (sodium dodecylbenzenesulfonate)	1.85
Versene 100 (sodium salt of EDTA)	0.19
Styrene	26.5
Methylmethacrylate	5.0
Methacrylic acid	68.5
DIBPH (diisopropylbenzenehydroperoxide)	0.10
FeSO ₄ •7H ₂ O	0.10

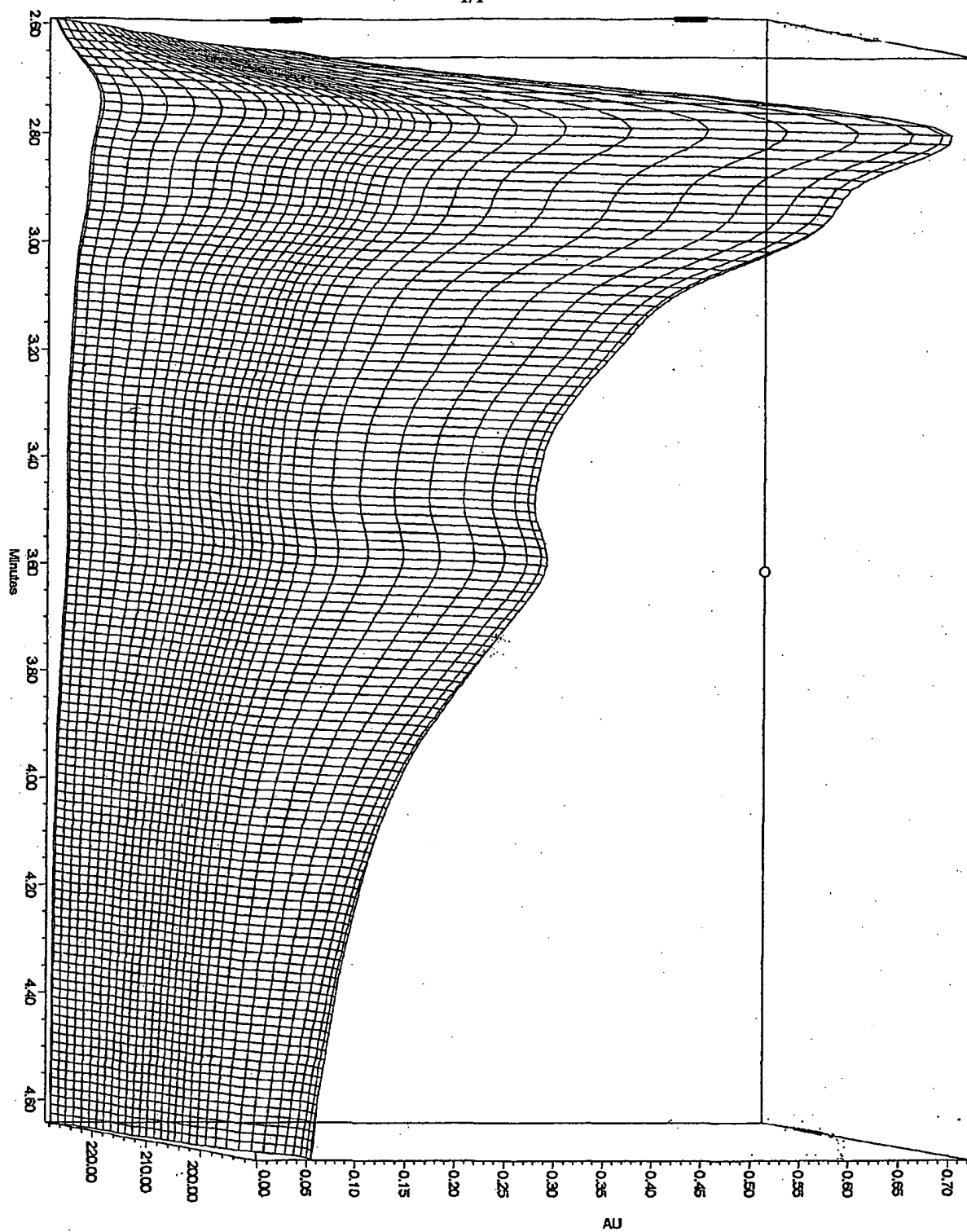
A nitrogen blanket was started, and 0.05 parts sodium sulfoxylateformaldehyde was added (in 5.75 parts water). The mixture was allowed to react for about 1 hour, during which time the temperature rose from about 19°C to about 36°C. An additional 0.10 parts DIBHP and 0.05 parts sodium sulfoxylateformaldehyde (in 5.75 parts water) were added. At this point, the viscosity of the mixture increased to that of a viscous mass, so that little or no mixing was imparted by the agitation. At about 1.5 hours of reaction time, an additional 0.94 parts Biosoft D-40 were added, and the reaction continued for another 0.5 hour. The resulting material had a solids content of 19.5, a viscosity of about 1400 cps and a particle size (determined on a Coulter N4 MD submicron particle size analyzer) of 243 nm.

WHAT IS CLAIMED IS:

1. An exhaustion agent, comprising an aqueous emulsion of polymerized monomers, wherein the monomers comprise:
 - (meth)acrylic acid;
 - alkyl (meth)acrylate; and
 - a substituted or unsubstituted styrene;and wherein the average particle size of the emulsified particles is less than about 220 nm.
2. The exhaustion agent of claim 1, wherein the polymerized monomers comprise about 20 wt% to about 80 wt% (meth)acrylic acid.
3. The exhaustion agent of claim 2, wherein the polymerized monomers comprise about 30 wt% to about 80 wt% (meth)acrylic acid.
4. The exhaustion agent of claim 1, wherein the polymerized monomers comprise about 5 wt% to about 80 wt% alkyl (meth)acrylate.
5. The exhaustion agent of claim 1, wherein the average particle size of the emulsified particles is less than about 215 nm.
6. The exhaustion agent of claim 5, wherein the average particle size of the emulsified particles is less than about 210 nm.
7. The exhaustion agent of claim 6, wherein the average particle size of the emulsified particles is between about 100 nm and about 210 nm.
8. The exhaustion agent of claim 1, wherein the monomers further comprise a fluorinated monomer.
9. The exhaustion agent of claim 8, wherein the fluorinated monomer comprises a perfluoroalkyl moiety.
10. The exhaustion agent of claim 9, wherein the fluorinated monomer further comprises a film forming moiety joined to the perfluoroalkyl moiety by a linking moiety.
11. The exhaustion agent of claim 10, wherein the film forming moiety comprises an unsaturated hydrocarbyl group.
12. The exhaustion agent of claim 11, wherein the linking moiety comprises a carbalkoxy group.
13. The exhaustion agent of claim 1, further comprising a fluoropolymer, and wherein the monomers have been polymerized in the presence of the fluoropolymer.

14. The exhaustion agent of claim 13, wherein the fluoropolymer forms an interpenetrating polymer network with the polymerized monomers.
15. A stable, exhaustible composition for treating fibers or fabric to increase oil repellency, water repellency, or both, comprising a stable aqueous dispersion of:
- a fluoropolymer;
 - an exhaust agent comprising an emulsion polymer of monomers comprising:
 - (meth)acrylic acid;
 - alkyl (meth)acrylate; and
 - a substituted or unsubstituted styrene;
 - and wherein the particles of the emulsion polymer have an average particle size less than about 220 nm; and
 - an optional hydrotropic compound.
16. The composition of claim 15, wherein the hydrotropic compound is an organic acid.
17. The composition of claim 16, wherein the organic acid is an aromatic sulfonic acid.
18. The composition of claim 17, wherein the aromatic sulfonic acid is a dodecyldiphenyloxide disulfonic acid.
19. The composition of claim 18, wherein the dodecyldiphenyloxide disulfonic acid is added as an aqueous solution having a solids content of about 40 wt% to about 70 wt%.
20. A stable, exhaustible composition for treating fibers or fabric to increase oil repellency, water repellency, or both, comprising a stable aqueous dispersion of the exhaustion agent of claim 13.
21. A stable, exhaustible composition for treating fibers or fabric to increase oil repellency, water repellency, or both, comprising a stable aqueous dispersion of the exhaustion agent of claim 8.
22. A method of increasing oil repellency, water repellency, or both, of a fiber or fabric, comprising:
- contacting the fiber or fabric with an aqueous solution comprising:
 - a fluoropolymer;
 - an emulsion of polymerized monomers, wherein the monomers comprise:
 - (meth)acrylic acid;

- alkyl (meth)acrylate; and
 - a substituted or unsubstituted styrene;
 - and having an average particle size of the emulsified particles is less than about 220 nm; and
 - an optional hydrotropic compound;
 - exhausting the fluoropolymer onto the fiber or fabric.
23. The method of claim 22, wherein the average particle size of the emulsified particles is between about 100 nm and about 200 nm.



INTERNATIONAL SEARCH REPORT

International Application No.
PCT/US01/49252

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : D06M 15/263

US CL : 252/8.61, 8.62

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 252/8.61, 8.62

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4,193,902 A (MONDT et al) 18 March 1980, col. 3, lines 8+, and the examples.	1-7
X	US 4,081,383 A (WARBURTON, JR. et al) 28 March 1978, example 1 and the claims.	1-7
X	JP 64-40510 A (NITTO ELECTRIC IND CO) 10 February 1989, abstract.	1-8

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"Z" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

27 JUNE 2002

Date of mailing of the international search report

01 AUG 2002

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LEXSEE 315 F3D 1330

IN RE LANCE G. PETERSON and IOANNIS VASATIS

02-1129, (Serial no. 08/365,392)

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

315 F.3d 1325; 2003 U.S. App. LEXIS 233; 65 U.S.P.Q.2D (BNA) 1379

January 8, 2003, Decided

PRIOR HISTORY: [**1] Appealed from: United States Patent and Trademark Office Board of Patent Appeals and Interferences.

reducing its hot corrosion resistance. Representative claim 5 recites:

DISPOSITION: AFFIRMED.

A nickel-base superalloy having special utility in the production of single crystal gas turbine engine blades consisting essentially of about 1 to 3 percent rhenium, about 14 percent chromium, about 9.5 percent cobalt, about 3.8 percent tungsten, about 2 percent tantalum, about 1.5 percent molybdenum, about 0.05 percent carbon, about 0.004 percent boron and, respectively, from about 3 to 4.8 percent aluminum, from about 4.8 percent to about 3 percent titanium, and balance substantially nickel.

COUNSEL: James T. Hosmer, Nixon & Vanderhye P.C., of Arlington, Virginia, argued for appellants. With him on the brief was Leonard C. Mitchard.

William LaMarca, Associate Solicitor, Office of the Director of the United States Patent and Trademark Office, of Arlington, Virginia, argued for the Director. With him on the brief were John M. Whealan, Solicitor, and Joseph Piccolo, Associate Solicitor.

JUDGES: Before LOURIE, BRYSON, and DYK, Circuit Judges.

OPINIONBY: LOURIE

(emphases added). Peterson and the Board considered that the other claims stand or fall with claim 5, and we will therefore consider only claim 5.

OPINION: [*1326] LOURIE, Circuit Judge.

Lance G. Peterson and Ioannis Vasatis (collectively, "Peterson") appeal from the decision of the U.S. Patent and Trademark Office ("PTO") Board of Patent Appeals and Interferences affirming the rejection of claims 1-7 of U.S. Patent Application 08/365,392 as obvious under 35 U.S.C. § 103. Ex Parte Wood, Appeal No. 1998-0535, Paper No. 19 (B.P.A.I. Apr. 23, [*1327] 2001). Because substantial evidence supports the Board's factual findings and the Board did not err in its conclusion of obviousness, we affirm.

BACKGROUND

On December 28, 1994, Mr. Peterson filed U. [**2] S. Patent Application 08/365,392, which is directed to a nickel-base single-crystal superalloy used in the manufacture of industrial gas turbine engines exposed to high temperatures. The claimed composition includes a relatively small amount of rhenium and aims to improve a single-crystal alloy's mechanical strength without

The examiner rejected claims 1-7 under 35 U.S.C. § 103 as obvious over the following prior art references: (1) [**3] published European Patent Application 240,451 ("Shah"); (2) published European Patent Application 076,360 ("Wukusick") alone or in view of U.K. Patent 2,153,848 ("Duhl"); and (3) U.S. Patent 3,619,182 ("Bieber") in view of Wukusick. For each ground of rejection, the examiner found a prima facie case of obviousness based on the overlapping element ranges of the prior art compositions and the claimed composition. Peterson responded by arguing that his invention would not have been obvious because the prior art disclosed only the optional use of rhenium and did not suggest that controlled amounts of rhenium would result in advantageous mechanical properties. Peterson also pointed to the unexpected results achieved by his invention: namely, the increased stress rupture life resulting from the addition of a small amount of rhenium. The examiner rejected those arguments in a final office action, finding that Peterson had failed to

show criticality of the selected amount of rhenium commensurate in scope with the claims.

The Board affirmed the examiner's rejection. First, the Board found that the disclosure of overlapping ranges in Shah, Wukusick, and Bieber each established a prima facie case of obviousness. With respect to the rejection based primarily on Wukusick, the Board determined that the claimed range of "about 14 percent chromium" encompassed Wukusick's teaching to use up to 12% chromium. Secondly, the Board found that Peterson had failed to show that the claimed alloy possesses properties that would have been considered unexpected by a person of ordinary skill in the art. Specifically, the Board found that Peterson had not compared the claimed invention with the closest prior art (Wukusick's Alloy 2) and had not shown that the claimed range of rhenium was critical to improving stress rupture life. Thus, the Board concluded that Peterson's evidence of nonobviousness did not outweigh the evidence of obviousness and affirmed the examiner's rejection of claims 1-7.

Peterson timely appealed. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(4)(A).

[*1328] DISCUSSION

The ultimate determination whether an invention would have been obvious under 35 U.S.C. § 103 is a legal conclusion based on underlying findings of fact. *In re Kotzab*, 217 F.3d 1365, 1369, 55 USPQ2d 1313, 1316 (Fed. Cir. 2000). We [**5] review the Board's legal conclusion of obviousness de novo and its underlying factual determinations for substantial evidence. *In re Gartside*, 203 F.3d 1305, 1316, 53 USPQ2d 1769, 1776 (Fed. Cir. 2000). Whether an invention has produced unexpected results and whether a reference teaches away from a claimed invention are questions of fact. *In re Mayne*, 104 F.3d 1339, 1343, 41 USPQ2d 1451, 1455 (Fed. Cir. 1997) (unexpected results); *Para-Ordnance Mfg. v. SGS Importers Int'l*, 73 F.3d 1085, 1088, 37 USPQ2d 1237, 1239 (Fed. Cir. 1995) (teaching away). Under the substantial evidence standard, we affirm the Board's factual determinations if they are based upon "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *In re Gartside*, 203 F.3d at 1312, 53 USPQ at 1773 (quoting *Consolidated Edison Co. v. NLRB*, 305 U.S. 197, 217, 83 L. Ed. 126, 59 S. Ct. 206 (1938)).

On appeal, Peterson argues that the cited prior art does not establish a prima facie case of obviousness because it does not suggest the claimed combination of "about 1 to 3 percent rhenium" with "about [**6] 14 percent chromium" to create an alloy having improved strength. As to the first ground of rejection, Peterson contends that a skilled artisan would not have assumed

from Shah that using the claimed amounts of rhenium and chromium would improve alloy strength because Shah defines very broad ranges for rhenium (0-7%) and chromium (3-18%), mentions rhenium only as an optional ingredient, and discloses a preferred alloy containing no rhenium. With respect to the second ground of rejection, Peterson asserts that the Board misconstrued the phrase "about 14 percent chromium" to include 12% chromium. Peterson also argues that Wukusick only discloses the optional use of rhenium and does not suggest the combined use of rhenium and chromium in the amounts claimed. As to the final ground of rejection, Peterson argues that Bieber does not mention rhenium as a component in its alloys and even warns that increasing the chromium content to improve corrosion resistance will have "catastrophic effects" on other properties.

Peterson alternatively argues that, even if a prima facie case of obviousness were established, the Board erred in determining that the evidence of nonobviousness was insufficient [**7] to rebut the prima facie case. Peterson points out that the claimed invention was the first to achieve the combination of corrosion resistance and improved strength for nickel-base single-crystal superalloys. Peterson thus contends that the examiner and the Board failed to appreciate the criticality of and the unexpected results achieved by the claimed combination of about 1-3% rhenium with, among other elements, about 14% chromium. Peterson further argues that Wukusick and Bieber teach away from the claimed invention by warning that high chromium contents can adversely affect alloy strength.

The PTO responds that the Board correctly found that the claimed composition would have been obvious based on any one of the three grounds of rejection because Shah, Wukusick, and Bieber all disclose ranges of elements that overlap the claimed ranges. The PTO argues that the Board properly interpreted the phrase "about 14 percent chromium" to include Wukusick's 12% chromium because Example I in Peterson's application discloses a superalloy containing 12.03% chromium.

[*1329] The PTO further responds that the Board correctly determined that Peterson failed to overcome the prima facie case of [**8] obviousness. The PTO contends that substantial evidence supports the Board's findings that Wukusick does not teach away from the invention and that Peterson failed to show unexpected results. Specifically, the PTO points out that Peterson's specification shows improved performance in stress rupture life only for 2% rhenium, rather than for the full claimed range of about 1-3% rhenium, and that Peterson failed to compare his results with the closest prior art.

A. The Prima Facie Case of Obviousness

A prima facie case of obviousness typically exists when the ranges of a claimed composition overlap the ranges disclosed in the prior art. E.g., *In re Geisler*, 116 F.3d 1465, 1469, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997); *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936-37 (CCPA 1976); *In re Malagari*, 499 F.2d

1297, 1303, 182 USPQ 549, 553 (CCPA 1974). Such is the case here. Claim 5 of Peterson's application recites and Shah discloses superalloys having the following compositions:

	Claim 5	Shah
Rhenium	about 1-3%	0-7%
Chromium	about 14%	3-18%
Cobalt	about 9.5%	0-20%
Tungsten	about 3.8%	0-18%
Tantalum	about 2%	0-15%
Molybdenum	about 1.5%	0-4%
Carbon	about 0.05%	at least 0.002%
Boron	about 0.004%	at least 0.002%
Aluminum	about 3-4.8%	3-8%
Titanium	about 4.8% to 3%	0-5%
Nickel	balance	balance

[**9]

Clearly, Peterson's application and Shah contain overlapping ranges, as each range listed in Peterson's claim 5 lies within the corresponding range disclosed in Shah. Thus, Shah's ranges encompass Peterson's.

Peterson argues that, despite that overlap, it would not have been prima facie obvious to select the claimed narrower ranges of rhenium and chromium from Shah's broader ranges of those elements. We disagree. In cases involving overlapping ranges, we and our predecessor court have consistently held that even a slight overlap in range establishes a prima facie case of obviousness. E.g., *In re Woodruff*, 919 F.2d at 1578, 16 USPQ2d at 1936-37 (concluding that a claimed invention was rendered obvious by a prior art reference whose disclosed range ("about 1-5%" carbon monoxide) abutted the claimed range ("more than 5% to about 25%" carbon monoxide)); *In re Malagari*, 499 F.2d at 1303, 182 USPQ at 553 (concluding that a claimed invention was rendered prima facie obvious by a prior art reference whose disclosed range (0.020-0.035% carbon) overlapped the claimed range (0.030-0.070% carbon)); see also *In re Geisler*, 116 F.3d at 1469, 43 USPQ2d at 1365 [**10] (acknowledging that a claimed invention was rendered prima facie obvious by a prior art reference whose disclosed range (50-100 Angstroms) overlapped the claimed range (100-600 Angstroms)). We have also held that a prima facie case of obviousness exists when the claimed range and the prior art range do not overlap but are close enough such that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 783,

227 USPQ 773, 779 (Fed. Cir. 1985) (concluding that a claim directed to an alloy containing "0.8% nickel, 0.3% molybdenum, up to 0.1% maximum iron, balance titanium" would have been prima facie obvious in view of a reference disclosing alloys containing 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium).

In light of that case law, we conclude that a prima facie case of obviousness was made out in this case. Selecting a narrow range from within a somewhat [**1330] broader range disclosed in a prior art reference is no less obvious than identifying a range that simply overlaps a disclosed range. In fact, when, as here, the claimed ranges [**11] are completely encompassed by the prior art, the conclusion is even more compelling than in cases of mere overlap. The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages. See *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980) ("Discovery of an optimum value of a result effective variable in a known process is ordinarily within the skill of the art." (citations omitted)). n1 We therefore conclude that a prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness. That is not to say that the claimed composition having a narrower range is unpatentable. Rather, the existence of overlapping or encompassing ranges shifts the burden to the applicant to show that his invention would not have been obvious, as we discuss below. Accordingly, because Shah's ranges encompass Peterson's, we

conclude that the Board did not err in determining that Shah renders Peterson's claimed composition prima facie obvious. n2 [**12]

n1 Although ranges that are not especially broad invite routine experimentation to discover optimum values, rather than require nonobvious invention, we do not have here any assertion that the disclosed range is so broad as to encompass a very large number of possible distinct compositions. We thus do not need to decide whether a disclosed range of such breadth might present a situation analogous to our cases involving the failure of a very broad disclosed genus of substances to render prima facie obvious specific substances within its scope. See, e.g., *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

n2 Consequently, we need not address the prima facie obviousness arguments based on the Wukusick, Duhl, and Bieber references. We note, however, that those references are less convincing than Shah in creating a prima facie case of obviousness. There is no genuine overlap between Wukusick's disclosed range of 7-12% chromium and Peterson's claimed range of "about 14 percent chromium." Peterson's only mention of an alloy having about 12% chromium is of a test alloy in its comparative Example I; it is not an example of Peterson's invention. Duhl and Bieber do not even mention rhenium, let alone disclose compositions with rhenium.

[**13]

B. Rebuttal of the Prima Facie Case

We turn next to Peterson's attempt to rebut the prima facie case of obviousness. In general, an applicant may overcome a prima facie case of obviousness by establishing "that the [claimed] range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Geisler*, 116 F.3d at 1469-70, 43 USPQ2d at 1365 (alteration in original) (quoting *In re Woodruff*, 919 F.2d at 1578, 16 USPQ2d at 1936). That same standard applies when, as here, the applicant seeks to optimize certain variables by selecting narrow ranges from broader ranges disclosed in the prior art. See *In re Geisler*, 116 F.3d at 1470, 43 USPQ2d at 1365 ("Only if the 'results of optimizing a variable' are 'unexpectedly good' can a patent be obtained for the claimed critical range." (quoting *In re Antonie*, 559 F.2d 618, 620, 195

USPQ 6, 8 (CCPA 1977))); *In re Wertheim*, 541 F.2d 257, 267, 191 USPQ 90, 100 (CCPA 1976) (recognizing that "ranges which overlap or lie inside ranges disclosed by the prior art may be patentable if the applicant [**14] can show criticality in the claimed range by evidence of unexpected results"). Moreover, the applicant's showing of unexpected results must be commensurate in scope with the claimed range. See *In re Greenfield*, 571 F.2d 1185, 1189, 197 USPQ 227, 230 (CCPA 1978) [*1331] ("Establishing that one (or a small number of) species gives unexpected results is inadequate proof, for 'it is the view of this court that objective evidence of non-obviousness must be commensurate in scope with the claims which the evidence is offered to support.'" (quoting *In re Tiffin*, 58 C.C.P.A. 1420, 448 F.2d 791, 792, 171 USPQ 294, 294 (CCPA 1971))).

We agree with the PTO that substantial evidence supports the Board's finding that Peterson failed to show that the addition of rhenium results in unexpected improvements in alloy strength for the entire claimed range of "about 1 to 3 percent" rhenium. The specification includes several examples of superalloy compositions and their respective strengths, measured by average rupture life. Of most relevance are the following data disclosed in those examples: Example I, which contains no rhenium, resulted in an average rupture life of about [**15] 34 hours. Example II, which includes 1% rhenium, resulted in an average rupture life of about 57 hours. Example III, which contains 2% rhenium, resulted in an average rupture life of about 114 hours.

Although those data show that alloy strength improved with the addition of rhenium, they do not evidence unexpected results for the entire claimed range of about 1-3% rhenium. From the few data points provided, the most significant improvement in stress rupture life occurred with the addition of 2% rhenium. However, the Board's implicit conclusion that the addition of rhenium in the lower portion of the claimed range did not produce unexpected results (i.e., the addition of 1% rhenium increased stress rupture life from 34 hours to only 57 hours) is supported by substantial evidence, and there are no data to show that the addition of rhenium in the uppermost portion of the claimed range (i.e., 3% rhenium) would lead to unexpected results. In fact, the only data that report the stress rupture life of an alloy having 3% rhenium seem to suggest the opposite. In an experiment similar to that demonstrated by Examples I-III, Example IV includes no rhenium and resulted in an average rupture [**16] life of about 148 hours. Example V, which contains 2% rhenium, resulted in an average rupture life of about 275 hours. Example VI, which contains 3% rhenium but less titanium than Examples IV and V, resulted in an average rupture life of only about 130 hours. Thus, the only data for an alloy

containing 3% rhenium actually show a decrease in average rupture life as compared with alloys having 0% or 2% rhenium. Moreover, whether an applicant has shown unexpected results is a question of fact, on which we defer to the Board. We therefore conclude that substantial evidence supports the Board's finding that Peterson has not shown unexpected results that are commensurate in scope with the claimed range of "about 1-3 percent" rhenium.

Alternatively, an applicant may rebut a prima facie case of obviousness by showing that the prior art teaches away from the claimed invention in any material respect. *In re Geisler*, 116 F.3d at 1469, 43 USPQ2d at 1365 (quoting *In re Malagari*, 499 F.2d at 1303, 182 USPQ at 553). Peterson contends that the prior art teaches away from the claimed invention in that Wukusick teaches that the amount of chromium must be reduced [**17] when rhenium is added to a nickel-base superalloy for strength purposes. Peterson also argues that Bieber teaches away from the invention by warning that a high chromium content can have "catastrophic effects" on alloy strength. We agree with the PTO that substantial evidence supports the Board's finding that the prior art does not teach away from the claimed invention. Although the Board [*1332] did not expressly address "teaching away" in the context of Peterson's attempt to rebut the prima facie case of obviousness, it did find that the Shah, Wukusick, and Bieber references teach the invention and themselves establish prima facie cases of obviousness. Implicitly, then, the Board found that those references do not teach away from Peterson's invention. Certainly the Shah reference, the rejection on which we have affirmed the Board's decision, does not teach away from the invention. While it mentions a preferred alloy that does not contain rhenium, it does not disparage or otherwise discourage the use of alloys containing rhenium. Although Wukusick and Bieber may suggest upper limits on chromium content in order to avoid adverse effects on alloy strength, they disclose alloys containing [**18] as much as 12% and 14% chromium, respectively. Moreover, Wukusick expressly teaches that adding rhenium will improve high-temperature strength. Thus, substantial evidence supports the Board's factual finding that the prior art does not teach away from Peterson's combination of about 1-3% rhenium with about 14% chromium. We thus conclude that the Board did not err in its determination that Peterson failed to rebut the prima facie case of obviousness or in its ultimate conclusion that Peterson's claimed superalloy would have been obvious under § 103.

CONCLUSION

Substantial evidence supports the Board's findings that Peterson's claimed element ranges are encompassed by the ranges disclosed in the Shah reference, that

Peterson did not show unexpected results commensurate in scope with the claimed range of rhenium, and that the prior art does not teach away from the claimed invention. Thus, the Board did not err in concluding that claims 1-7 would have been obvious under § 103. Accordingly, the Board's decision is

AFFIRMED.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
)	
Dennis J. Jones, Jr.	)	Art Unit: 1751
)	
Application No. 10/627,945	)	Examiner: Unassigned
)	
Filing Date: July 24, 2003	)	Confirmation No. 3664
)	
For: METHODS OF TREATING AND)	
CLEANING FIBERS, CARPET YARNS)	
AND CARPETS)	

PRELIMINARY AMENDMENT
PURSUANT TO 37 CFR §1.115 AND 37 CFR §1.121

Mail Stop AMENDMENT
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450
Facsimile: (703) 872-9306

NEEDLE & ROSENBERG, P.C.
Customer No. 23859

Sir:

Prior to the issuance of an Office Action pertaining to the above-referenced patent application, please enter the following preliminary amendment in the application and consider the following remarks.

Amendments to the Claims are reflected in the listing of claims which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1-44 (canceled)

45) (New) An aqueous treating composition comprising tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), wherein the tannic acid is present in the aqueous treating composition at up to about 0.5 pbw, based on a total weight of the aqueous treating composition.

46) (New) The treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 2.0 pbw.

47) (New) The treating composition of claim 45, wherein the tannic acid is present in the composition at from about 0.005 pbw to about 0.4 pbw.

48) (New) The aqueous treating composition of claim 45 having a pH of less than about 3.0.

49) (New) The aqueous treating composition of claim 45, further comprising:

- a) a stain resist compound;
- b) a crosslinking agent;
- c) a fluorochemical; or
- d) an organosilicate material.

50) (New) The aqueous treating composition of claim 49, wherein the stain resist compound is present and comprises:

- a) a polymer or copolymer of methacrylic acid;
- b) a phenolic resin;
- c) styrene-maleic anhydride copolymer; or
- d) an aqueous emulsion of polymerized monomers, wherein the monomers comprise (meth)acrylic acid, alkyl (meth)acrylic acid, and a substituted or unsubstituted styrene.

51) (New) The aqueous treating composition of claim 49, wherein the stain resist compound is present at from greater than 0.0 pbw to about 2.0 pbw solids, based on a total weight of the aqueous treating composition.

52) (New) The aqueous treating composition of claim 49, wherein the crosslinking agent is present and comprises antimony potassium tartrate or stannous chloride.

53) (New) The aqueous treating composition of claim 49, wherein the fluorochemical is present at from about 0.0001 pbw to about 5.0 pbw, based on a total weight of the aqueous treatment composition.

54) (New) A method of treating fiber, yarn or carpet comprising:

- a) applying a first aqueous treating composition to fiber, yarn or carpet, wherein the first aqueous treating composition comprises tannic acid and a crosslinking agent; and
- b) applying a second aqueous treating composition to the fiber, carpet or yarn, wherein the second aqueous treating composition comprises:
 - i) a stain resist compound;

- ii) one or more a crosslinking agents;
- iii) a fluorochemical; or
- iv) an organosilicate material.

55) (New) The method of claim 54, wherein the tannic acid has a gallic acid content of less than about 3.0 parts by weight.

56) (New) The method of claim 54, wherein the treated fiber, yarn or carpet has up to about 5.0 owf tannic acid, based on a total weight of the dried fiber, yarn or carpet.

57) (New) The method of claim 54, wherein the crosslinking agent in the first aqueous treating solution comprises antimony potassium tartrate.

58) (New) The method of claim 54, wherein the stain resist compound is present in the second aqueous treating composition and comprises:

- a) a polymer or copolymer of methacrylic acid;
- b) a phenolic resin;
- c) styrene-maleic anhydride copolymer; or
- d) an aqueous emulsion of polymerized monomers, wherein the monomers comprise (meth)acrylic acid, alkyl (meth)acrylic acid, and a substituted or unsubstituted styrene.

59) (New) The method of claim 54, further comprising a heating step between a) and b) at a temperature of from about 160 °F to about 260 °F for a period of time ranging from about 15 to about 60 minutes.

60) (New) The method of claim 54, wherein the first aqueous treating solution further comprises:

- a) a stain resist compound;
- b) a fluorochemical; or
- c) an organosilicate material.

61) (New) The method of claim 60, wherein the stain resist compound is present in the first aqueous treating composition and is applied to the fiber, yarn or carpet at up to about 4.0 owf.

62) (New) The method of claim 60, wherein the stain resist compound is present in the first aqueous treating composition and is applied to the fiber, yarn or carpet at from about 0.25 to about 3.0 owf.

63) (New) The method of claim 60, wherein the stain resist compound is present in the first aqueous treating composition and comprises:

- a) a polymer or copolymer of methacrylic acid;
- b) a phenolic resin;
- c) styrene-maleic anhydride copolymer; or
- d) an aqueous emulsion of polymerized monomers, wherein the monomers comprise (meth)acrylic acid, alkyl (meth)acrylic acid, and a substituted or unsubstituted styrene.

- 64) (New) The method of claim 60, wherein the fluorochemical is present in the second aqueous treating composition and is applied to the fiber, yarn or carpet in an amount ranging from about 100 to about 800 ppm, based on a total weight of the dried fiber, yarn or carpet.
- 65) (New) The method of claim 60, wherein the crosslinking agent is present in the second aqueous treating composition and comprises stannous chloride.
- 66) (New) The method of claim 54, wherein either or both of the first and second aqueous treating compositions has a pH of less than about 3.
- 67) (New) A method of treating fiber, yarn or carpet comprising:
- a) applying a first aqueous treating composition to fiber, yarn or carpet, wherein the aqueous treating composition comprises tannic acid, and wherein the tannic acid has a gallic acid content of less than about 3.0 parts by weight.

ATTORNEY DOCKET NO. 03269.0109U1
Application No. 10/627,945

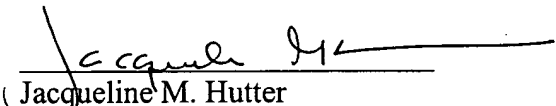
Remarks

Claims 1-44 have been canceled. New claims 45-68 have been added. No new matter has been added by this amendment, and Applicant respectfully requests entry of same into the present application.

No fee is believed to be due in connection with this submission; however, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

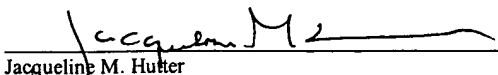
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Jacqueline M. Hutter

10/26/04
Date

EXHIBIT B

559 F.2d 618, *; 1977 CCPA LEXIS 118, **;
195 U.S.P.Q. (BNA) 6

LEXSEE 559 F.2D 618

IN THE MATTER OF THE APPLICATION OF RONALD L. ANTONIE

Patent Appeal No. 76-681.

UNITED STATES COURT OF CUSTOMS AND PATENT APPEALS

559 F.2d 618; 1977 CCPA LEXIS 118; 195 U.S.P.Q. (BNA) 6

AUGUST 18, 1977, Decided

PRIOR HISTORY: [**1]

Serial No. 331, 796.

COUNSEL:

Arthur H. Seidel, Thomas W. Ehrmann, Milwaukee, Wis. (Quarles & Brady, Milwaukee, Wis.), attorneys of record, for appellant.

Joseph F. Nakamura, Washington, D.C. for the Commissioner of Patents, R. D. Edmonds, Washington, D.C., of counsel.

OPINION BY:

BALDWIN

OPINION: [*618]

BALDWIN, Judge.

This is an appeal from a decision of the Patent and Trademark Office (PTO) Board of Appeals (board) affirming the rejection of claims 1, 2 and 3 of an application for "Rotating Biological Contactor Apparatus" n1/ as obvious under 35 USC 103 in view of El-Naggar. n2/ We reverse.

n1/ Serial No. 331, 796, filed February 12, 1973.

n2/ "Method of Treatment of Sewage by Bio-Oxidation and Apparatus Therefor," U.S. Patent No. 3,335,081, issued August 8, 1967.

The Invention

Appellant claims a wastewater treatment device in which wastewater is continuously passed through a tank. Semiimmersed contactors (disks) are continuously rotated to aerate their immersed portions and thereby to aerate both microorganisms that grow on the contactors

and the wastewater itself. For this discussion, several variables are important in this device. "Throughput" is the volume [**2] of wastewater per unit time (gal./day) which the device must treat. "Contactor area" is the total area of the contactors which is exposed to the wastewater as the contactors are rotated (sq. ft.). "Tank volume" is the actual volume of liquid in the tanks in which the contactors [*619] rotate (gal.). The ratio of throughput to contactor area (gal./day/sq. ft.) is called the "hydraulic loading." Two concepts of effectiveness of the equipment are important in this discussion. The primary prior art reference uses the term "efficiency" to denote the percent impurity reduction which a given set-up of the device achieves and we shall so use the term. Appellant uses the term "maximum treatment capacity" to denote when a unit of contactor area is providing maximum "efficiency" for a given "throughput" or maximum "throughput" for a given "efficiency." It is essential to understand the distinction between "efficiency," a matter of ultimate effectiveness independent of the efficiency of the equipment, and "treatment capacity," a matter of the efficiency or effectiveness of a unit of contactor area. The latter is more properly associated with the normal use of the term "efficiency" denoting [**3] maximum result from a limited resource.

Appellant's claimed device has a ratio of tank volume to contactor area of 0.12 gal./sq. ft. n3/ Appellant maintains that this ratio is the most desirable or optimum for all set-ups of the device in the sense that using a lower value gives lower "treatment capacity" and using a greater value gives no increase in "treatment capacity," merely increasing costs. Thus, the value is optimum in that it maximizes "treatment capacity" so that the effectiveness of a given contactor is maximized.

n3/ Claims 1 and 2 recite "at least about 0.12" while claim 3 recites "about 0.12."

The Prior Art

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El-Naggar teaches the basic structure of the device claimed by appellant but is silent regarding quantitative design parameters other than to give data on a single example, which data was apparently complete except for any discussion of "tank volume." El-Naggar stated the "efficiency" (obviously referring to the purity of the output) could be increased to 95% by increasing the area of the contactor.

The Rejection

The examiner rejected the claims as obvious under 35 USC 103, noting that the basic device in question is old as taught by El-Naggar. [**4] While the ratio of tank volume to contactor area of 0.12 gal./sq. ft. is not disclosed in El-Naggar, the examiner reasoned that the disclosure of El-Naggar would make a device with that optimum value obvious. The examiner noted that El-Naggar suggests increasing the "efficiency" (degree of purification) of his device by increasing the contactor area while apparently keeping the "throughput" constant, that is, reducing the "hydraulic loading." The examiner then assumed that El-Naggar teaches keeping the tank volume constant while increasing the contactor area. Thus, the examiner argued that the idea of increasing tank volume to surface area to increase efficiency is taught and that working out the value for optimum efficiency is mere mechanical experimentation. The board accepted the examiner's reasoning.

OPINION

In determining whether the invention as a whole would have been obvious under 35 USC 103, we must first delineate the invention as a whole. In delineating the invention as a whole, we look not only to the subject matter which is literally recited in the claim in question (the ratio value) but also to those properties of the subject matter which are inherent in the subject [**5] matter and are disclosed in the specification. *In re Davies*, 475 F.2d 667, 177 USPQ 381 (CCPA 1973). In this case, the invention as a whole is the ratio value of 0.12 and its inherent and disclosed property. That property is that the described devices designed with the ratio will maximize treatment capacity regardless of the values of the other variables in the devices. Just as we look to a chemical and its properties when we examine the obviousness of a composition of matter claim, it is this invention as a whole, and not some part of it, which must be obvious under 35 USC 103. Cf. *In re Papesch*, 50 CCPA 1276, 315 F.2d 381, 137 USPQ 43 (1963). [*620]

The controlling question is simply whether the differences (namely the value of 0.12 and its property) between the prior art and appellant's invention as a whole are such that appellant's invention as a whole would have been obvious. The answer is no. It is impossible to

recognize, from the experiment taught by El-Naggar, that "treatment capacity" is a function of "tank volume" or the tank volume-to-contactor area ratio. Recognition of this functionality is essential to the obviousness of conducting experiments to determine [**6] the value of the "tank volume" ratio which will maximize treatment capacity. Such functionality can only be determined from data representing either efficiency at varying tank volume, fixed throughput, and fixed contactor area or throughput at varying tank volume, fixed efficiency, and fixed contactor area. Each of these experiments represents treatment capacity with fixed contactor area but varying tank volume. This sort of experiment would not be suggested by the teachings of El-Naggar since he was not trying to maximize or control "treatment capacity." The experiments suggested by El-Naggar do not reveal the property which applicant has discovered, and the PTO has provided us with no other basis for the obviousness of the necessary experiments.

The PTO and the minority appear to argue that it would always be obvious for one of ordinary skill in the art to try varying every parameter of a system in order to optimize the effectiveness of the system even if there is no evidence in the record that the prior art recognized that particular parameter affected the result. n4/ As we have said many times, obvious to try is not the standard of 35 USC 103. *In re Tomlinson*, 53 CCPA 1421, [**7] 363 F.2d 928, 150 USPQ 623 (1966). Disregard for the unobviousness of the results of "obvious to try" experiments disregards the "invention as a whole" concept of § 103, *In re Dien*, 54 CCPA 1027, 371 F.2d 886, 152 USPQ 550 (1967) and *In re Wiggins*, 55 CCPA 1356, 397 F.2d 356, 158 USPQ 199 (1968), and overemphasis on the routine nature of the data gathering required to arrive at appellant's discovery, after its existence became expected, overlooks the last sentence of § 103. *In re Saether*, 492 F.2d 849, 181 USPQ 36 (CCPA 1974).

n4/ The precise nature of the El-Naggar experiment and the nature of the data which would result are rendered hopelessly speculative by El-Naggar's total failure to discuss the critical matter of what is done with the volume of the tank. The PTO appears to assume, as a necessary element of its conclusion, that appellant's ratio is the inevitable result of El-Naggar experiment, and that the tank volume is fixed, apparently because El-Naggar does not suggest changing the tank as additional contactor area is supplied. Even if the same tank were used, the actual liquid volume of the tank could change significantly if 1) the tank has a level control, 2) the tank is not extremely large in comparison to the contactors

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and 3) the volume-to-area ratio of the contactors themselves is significant. Since these assumptions are not unreasonable, there is serious doubt as to the constant volume of the tank.

Whether one would inevitably arrive at the ratio value of 0.12 or above depends on facts which must be read into El-Naggar, (e.g., the volume of the tank) and on assumptions about the kind of motivation (e.g., the degree of "efficiency" which would be sought). All of this involves, at least on this record, mere speculation. Assuming, as the examiner has, that the tank volume is fixed and the natural motivation is to maximize efficiency, if El-Naggar's equipment has a tank volume to contactor area ratio of less than 0.12, and the resulting efficiency is found wanting, increasing the contactor area to increase "efficiency" will lead away from the claimed ratio.

[**8]

In *In re Aller*, 42 CCPA 824, 220 F.2d 454, 105 USPQ 233 (1955), the court set out the rule that the discovery of an optimum value of a variable in a known process is normally obvious. We have found exceptions to this rule in cases where the results of optimizing a variable, which was known to be result effective, were unexpectedly good. *In re Wymouth*, 499 F.2d 1273, 182 USPQ 290 (CCPA 1974); *In re Saether*, *supra*. This case, in which the parameter optimized was not recognized to be a result-effective variable, is another exception. The decision of the board is reversed.

REVERSED

MILLER, J., concurs in the result.

DISSENTBY:

MALETZ

DISSENT: [*621]

MALETZ, Judge, */ dissenting, with whom RICH, Judge, joins.

a1/ Judge of the United States Customs Court sitting by designation pursuant to 28 USC 293(d).

With all due respect, I cannot agree with the majority's interpretation of the El-Naggar patent. El-Naggar discloses the same wastewater treatment apparatus as claimed, except for the specific volume-to-surface ratio of .12 gallons per square foot as recited in the claims. However, El-Naggar generally discloses varying the number of disks (column 3, lines 31-35), the

number [**9] of concentric cylinders (column 4, lines 27-30), or the length of the cylinders (column 4, lines 61-62) in his apparatus in order to optimize results. Given the basic apparatus of El-Naggar and the concept of varying the number of disks in a tank in order to optimize impurity removal, I believe that it would have been well within the capabilities of the chemical engineer of ordinary skill to determine empirically, by routine experimentation, the optimum design ratio which appellant has determined and recited in his claims. That is, El-Naggar set the way, and appellant's work was what any routineer would have accomplished in following the patent teachings.

Appellant urges that the results which he determined empirically by plotting the effect of volume-to-surface ratio on impurity removal, including the specific, optimum design ratio of .12 gallons per square foot, could not have been predicted from El-Naggar. However, obviousness under 35 USC 103 does not require absolute predictability, *In re Kronig*, 539 F.2d 1300, 190 USPQ 425 (CCPA 1976), and it is sufficient here that El-Naggar clearly led the way for the routineer to arrive at the claimed apparatus.

I am in substantial [**10] agreement with the board's analysis of this case, and I would affirm the board's decision.

WO9521955

Publication Title:

PROCESS TO IMPROVE RESISTANCE TO STAINS ON FIBRES AND DERIVED PRODUCTS

Abstract:

Abstract of WO9521955

The invention consists of a process to improve the resistance to stains on fibres, processed or not, finished or not on the basis of dyeable natural or synthetic fibres, in particular polyamide. According to the invention the fibres are treated with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphthol-derivate with an aldehyde. The treatment can be made before, during or after the dyeing process. The treatment is done in an acid medium. Data supplied from the esp@cenet database - Worldwide d67

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(54) Title: PROCESS TO IMPROVE RESISTANCE TO STAINS ON FIBRES AND DERIVED PRODUCTS (57) Abstract <p>The invention consists of a process to improve the resistance to stains on fibres, processed or not, finished or not on the basis of dyeable natural or synthetic fibres, in particular polyamide. According to the invention the fibres are treated with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphthol-derivate with an aldehyde. The treatment can be made before, during or after the dyeing process. The treatment is done in an acid medium.</p>		

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DESCRIPTION

Process to improve resistance to stains on fibres and derived products

This invention relates to a process to improve the resistance to stains on dyeable natural and synthetic fibres and in particular polyamide fibres.

By "fibres" has to be understood, fibres or yarns whether greige (raw) or processed, unfinished or finished, bright as well as dull, thermofixed or not, in yarn form or processed to fabric, felt, knitwear, non-wovens, carpets, rugs, etc. To simplify matters, in this description fibres in which form whatsoever will be called "substrate".

Removal of stains, coloured or not, from a substrate, is still a very delicate problem, as there could remain traces or spots either by discoloration or coloration of the original substrate caused by the stain or by the detergents which affect the dyestuff of the substrate. This is especially the case for stains caused by products containing chlorine, oxidative bleaching agents, and stains containing persistent dyestuffs or pigments for instance present in coffee, tea, wine, fruit juices, inks...

The purpose of this invention is to propose a process by which the resistance of a coloured or uncoloured substrate against stains of any nature is considerably improved whilst at the same time also other improved characteristics are obtained such as an improved antistatic behaviour, resistance to products such as turpentine and white spirit as well as resistance to soiling, mildew and house-mite.

It is known (C.A. Vol. 97 (1982) 7.704 U) that tannin is used to fix dyestuff after the dyeing process. On the other hand it is also known from the swimwear industry, to treat coloured nylon fabric with extraction's of gallotannin to improve the colour fastness to chlorine. This was based on the fact that the additional treatment of coloured nylon fabric with gallotannin extraction's caused a migration of the dyes in the fibre whereby the gallotannin is fixed on the fibre. This provides a certain resistance to discoloration of the substrate by products containing chlorine. However this treatment has no known effect on coloured stains, and on stains caused by other oxidative bleaching agents.

On the other hand, it is known from the US patent No. 4.501.591, to treat polyamide fibres after application of the dyestuff, with condensation products of sulphonated phenol- or naphtol-formaldehydes in presence of an alkaline metal silicate. It has been shown that for polyamide fibres, this treatment provides resistance to colour stains and particularly effective for anionic dyes. This treatment has no effect whatsoever on chlorine stains and on stains of other oxidative bleaching agents.

In the cosmetic industry, there is an increasing use of strong oxidative bleaching agents, such as benzoylperoxyde. Resistance to stains caused by this type of products is unknown in the textile industry.

During extensive research in this field, it has now surprisingly been demonstrated that the resistance of coloured or uncoloured substrate to stains or to deterioration of the fibres caused by oxidative bleaching agents, is considerably improved when the substrate is treated with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde.

It has also been found that this treatment is also very effective against stains caused by dyes of natural or synthetic origin of anionic, cationic, metalcomplex or disperse nature.

That the tannic acid would improve the discoloration caused by chlorine, could be expected by the man skilled in the art,

but that treatment with the solution mentioned above would be more efficient than a normal tannic acid treatment, could not be predicted.

Furthermore, the resistance to coloured stains obtained by a treatment with a condensation product of a sulphonated phenol- or
5 naphtol-formaldehyde is not only met by the treatment with the solution according to the invention, but is considerably improved.

The effectiveness of the solution containing both components (tannic acid and condensation product) is not only better than this of the separate components, but also provides a protection
10 against a wide range of coloured stains for which the individual components were not effective.

The interaction of these two components increases the efficiency of the individual components and provides unexpected additional properties, such as protection against coloured stains of
15 cationic, metalcomplex and disperse nature, and especially against stains caused by oxidative bleaching agents.

According to the invention, the substrate, in acid medium, is treated with a solution containing 1 to 6% (weight %) active component, consisting of 10 to 90%, preferably 40 to 80% tannic acid
20 (tannic acid component) and 10 to 90%, preferably 20 to 60% condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde (sulphon component).

These concentrations and proportions are not critical, though it has been noticed that higher concentrations hardly influence
25 the result but could cause a yellowing of the substrate.

The components will be preferably dissolved in water, though another medium such as alcohol, acetone, etc... is also possible.

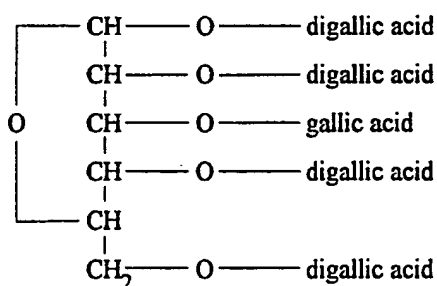
According to a preferred embodiment of the invention, the
30 substrate is treated during the dyeing process. The treatment can be inserted in a continuous as well as well as in a discontinuous dyeing process. When applied in a continuous dyeing process, the treatment can be done before as well as during or after the effective dyeing step. In a discontinuous dyeing process, posttreatment is preferred.

Tannic acid is a compound derived for several centuries from nutgalls and has a structure of polygalloylglucose or polygalloylquinic acid.

5 The term "tannic acid" as used in this description and claims should be understood in a broad sense, and covers products containing tannic acid, such as for instance gallotannin.

In fact tannic acid is a mixture of compounds consisting of a glucose-chain which is several times substituted with gallic acid or trihydroxy-3,4,5-benzoic-acid-1. Substitution can also be made
10 with digallic acid or with trigallic acid.

Tannic acid e.g. contains nonagalloylglucose, a glucose-chain substituted 5 times with gallic acid, 4 times of which is digallic acid and the formula of which is the following:



15

According to the invention, any commercial tannic acid can be used, though it is economical to use a tannic acid with a relatively high molecular weight. The molecular weight of the tannic acid will preferably be between 700 and 3500, though this range is not
20 critical.

It has also been found that optimum results can be achieved when the tannic acid component consists of a mixture of a tannic acid with a relatively low MW and a tannic acid with a relatively high MW. So it has been shown that a mixture, consisting
25 of a tannic acid with an average MW lower than 1000 and a tannic acid with an average MW higher than 1500, can give better results than tannic acid of exclusively 1500 MW.

The tannic acid component is preferably used in an aqueous solution. For the man skilled in the art, it will be clear that the water has preferably to be de-ironed and softened.

The solution to be applied will contain 10 to 60 g tannic acid per litre of water, preferably 15 to 25 g/l. To avoid oxidation of the solution, a small quantity of an aliphatic mono carboxylic acid with a boiling-point lower than 100°C, e.g. acetic acid, can be added.

To avoid oxidation of the substrate, it is also recommended to add a non volatile, non hygroscopic and preferably non corroding acid, as e.g. an aliphatic carboxylic acid such as citric acid or polyacrylic acids. It could also be economical to add a wetting agent, such as e.g. isopropanol.

The sulphonic component is a condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde. Such compounds contain at least a sulphonic group in acid and/or salt form, which is combined with at least a carbon atom of a phenol or naphtol group. The product can be synthesized by reaction of one of these compounds with an aldehyde e.g. formaldehyde. Some of these products and their preparation are described in the above mentioned US patent No. 4.501.591. The sulphonic-component, in a concentration of 5 to 50 g/l, can be added to the solution containing the tannic acid component.

It can be advantageous to increase the molecular chain of the components for instance through cross-linking by adding to the solution or to the rinsing water a complexing agent, such as aluminium potassium sulphate or potassium antimonyl tartrate, or a compound reducing the solubility of the sulphon component, such as silicium dioxide gel, a magnesium or zirconium salt, ... whereby the complexing agent can have a cross-linking effect on the tannic acid and the sulphon component.

The solution containing both components must preferably have a pH between 2,5 and 5, and eventually be adjusted by adding an acid for instance a sulfamic acid, formic acid, acetic acid... Strong mineral acids have to be avoided.

According to an embodiment of the invention, the substrate to be dyed, will first be treated with the mixture of both components according to the invention and afterwards cold dyed.

5 The expression "dyed or dyeing" as used in this description means any process by which dyes are applied on a substrate, such as dyeing, printing, spacing, spraying, etc...

The dyes to be applied are dissolved in water, eventually by heating, and afterwards adjusted to the right volume with cold water. The operation will preferably be done in an acid medium.

10 When applying the dyestuff in a continuous printing process, an acid-resisting thickening agent, such as an hydrocolloide, e.g. Xanthanegum, will preferably be added.

Dyestuffs suitable to be used when applying the mixture according to the invention, are in general acid as well as metalcomplex or disperse dyes. Basic dyestuffs are less suitable, due to the acid conditions.

In case basic dyes are used, it is recommended to apply the treatment according to the invention, as an additional treatment.

20 Also in a differential dyeing or cross dyeing process, when acid and basic dyes are used, it will be recommended to apply the treatment with the tannic acid- and sulphon-components as an additional operation after dyeing.

For the man skilled in the art, it is obvious to select dyestuffs which fit in the described process and do not cause any side-reactions with the applied reagentia and products.

25 A good preselection of dyestuffs will be made through obvious criteria. For the process to be followed, it can e.g. be useful to select dyestuffs with fast fixing properties.

Below, some dyestuffs that fit in very well in the frame of the invention, are mentioned as non restrictive examples. The dyestuffs are indicated with their corresponding colour index number as it is common practice.

- Acid Yellow 121, 219 and 230
- Acid Orange 116 and 156
- 35 • Acid Red 42, 243, 299 and 395

- Acid Blue 40, 113, 129 and 344
- Acid Black 172
- Mordant Orange 6
- Disperse Yellow 2
- 5 • Disperse Red 55.1 and 340
- Disperse Blue 7
- Basic Red 23 and 73
- Basic Yellow 45 and 63
- Basic Blue 45 and 129.

10 Other dyestuffs have also been tested with satisfactory results.

 According to another embodiment of the invention, the solution of tannic acid-component and sulphon-component, can also be added directly to the dye bath, so that the substrate can simultaneously
15 both be dyed and treated with the solution according to the invention.

 In case of a continuous process, the substrate, after dyeing, is preferably steamed during a half to a few minutes with airfree saturated steam. After steaming, the coloured substrate is rinsed, preferably with cold water, at which a stabilizer can be added,
20 preferably a non volatile, non hygroscopic, and non corroding acid, e.g. an aliphatic carboxylic acid, in a concentration e.g. between 0,5 to 5 g/l.

 According to a further embodiment of the invention, the substrate can be dyed following the standard process, and at any time
25 post-treated with the solution according to the invention. In this case the dyed substrate is treated with the solution containing both components, during a few minutes, preferably warmed up to a temperature of $\pm 80^{\circ}\text{C}$. The treated substrate is then rinsed, steamed and dried following the normal process.

30 When applied in a discontinuous process, the substrate is preferably dyed according to normal dyeing procedures, and then posttreated in a bath with a solution of tannic acid- and sulphon-components. The bath containing the substrate is preferably gradually warmed up till $\pm 80^{\circ}\text{C}$. Then the substrate is cooled, rinsed and dried.

It is clear that the improved characteristics can also be obtained by treating a substrate in a two step process, whereby in a first step one of the components (tannic acid-component or sulphon-component) is applied and in a second step the other component, whereby it can be possible to apply for instance the first step before and the second step after dyeing. Such an embodiment needs however an additional treatment.

When a substrate is treated according to one of these embodiments, an unknown resistance to oxidative bleaching agents and chlorine is noticed. Also an unknown resistance to colour stains of natural or synthetic origin containing anionic, cationic, metalcomplex or disperse dyestuffs, is achieved.

Stains of coffee at 70°C, kool-aid (highly coloured soft-drink), wine, ink, etc., can easily be removed by wetting the stain with cold or lukewarm water, and dry dabbing.

An additional advantage of the process according to the invention is, that a coloured substrate shows a better resistance to products such as turpentine and white spirit, and an improved resistance to mildew and house-mite has been observed.

Tests have been executed with respect to light-fastness and washing-fastness, and showed that the process has no influence on the light fastness and a rather positive influence on the washing fastness.

The process and the various ways of applying it is described more in detail below, by way of following non restrictive examples:

Example 1

A solution was prepared by dissolving 10 g tannic acid with a MW of 900 (Mijimoto commercial product) in 10 g/l tannic acid with a MW of 2000 (Mijimoto commercial product) in 1 l of soft water. To this, 25 ml of Alguard NS (Allied Colloids) (40% aqueous solution) was added. Then 2 g of a mixture of polyacrylic acids (Eulysine S BASF) and 5 ml acetic acid 80% was added as stabilizer,

as well as 5 ml isopropanol as wetting agent. The pH of the solution was 2.5.

5 A piece of substrate (A) consisting of polyamide 6.6 in the form of spun yarns (as used in velvet) was soaked in this solution at room temperature and squeezed till an uptake equal to 100% substrate.

The wet substrate was printed over with Acid Yellow 230. To this end 1 g of dyestuff was dissolved in 0,1 l of warm water, then cold water was added to 1 l. To this solution, 5 ml acetic acid 80%
10 was added, until a pH of 3.5 was obtained. Finally, Xanthanegum Type Kelzan was added until the required viscosity was reached.

After that the substrate was printed, it was steamed with airfree saturated steam at 98°C during 2 minutes, and then rinsed with cold water. At the rinsing water and/or the last rinsing bath, 2 g of a
15 mixture of polyacrylic acids (Eulysine S) per litre of water was added. Then the substrate was dried at 100°C.

Comparative 1 a

20 A piece of substrate (B) from the same material as substrate (A) was dyed with the same dye solution after it has been moistened with an aqueous solution of acetic acid to which isopropanol was added, but without tannic acid or any condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde. The coloured substrate was steamed and rinsed in the same
25 way as in example 1.

Comparative 1 b

30 A piece of substrate (C) from the same material as substrate (A) was dyed with the same dye solution after it has been treated with an aqueous solution to which 20 g/l tannic acid, as well as acetic acid and isopropanol was added, but not sulphonated condensation product. The coloured substrate was steamed and rinsed in the same way as in example 1.

Comparative 1 c

A piece of substrate (D) from the same material as substrate (A) was dyed with the same dye solution after it had been moistened with an aqueous solution containing Alguard NS and additives in the same concentration as in example 1, but without adding tannic acid. The coloured substrate was steamed and rinsed in the same way as in example 1.

The substrates were subject to following tests:

10

Test 1: Benzoylperoxide test

1 cc of a skincare product, Mytolac (Richardson-Vicks), a commercial product containing 5% benzoylperoxide, was spotted on substrates A, B, C and D.

15

The stain was left to dry during 24 hours and then treated with cold water and dabbed dry.

From substrate A, the stain had completely disappeared and there were no traces of any discoloration left.

20

Substrates B and D were completely discoloured and an orange stain was left.

On substrate C, the stain had disappeared for about 70%, but showed a clear discoloration.

Test 2: Coffee test

25

A cylinder Ø 4 cm and 40 cm high was placed on the substrate. At the bottom of the cylinder, 10 ml of hot coffee at 70°C was injected, whilst on top of the cylinder a weight of 300 g was dropped to press the coffee into the substrate. This was left untouched during 24 hours.

30

After 24 hours, the coffee stain was dabbed with hot water (60°C) and dried up with an absorbing tissue.

The stain on substrate A had completely disappeared.

On substrate B, the treatment had practically no effect on the stain which was only removed for 20%. A further treatment with household bleaching water containing 1 g/l active chlorine was needed

to remove the stain. The chlorinated water left a clearly visible pale stain.

On substrate C, the stain was removed for the major part (80%), but a trace remained visible. A further treatment with household bleaching water containing 1 g/l active chlorine was needed to remove the stain. The chlorinated water left a slightly visible pale stain.

On substrate D, the stain was partly removed ($\pm 60\%$), but still well visible. A further treatment with household bleaching water containing 1 g/l active chlorine was needed to remove the stain. The chlorinated water left a clearly visible pale stain.

Test 3: Red wine test

With the same testing material as for the test mentioned above, 10 ml of red wine was brought on the substrate and left during 24 hours. Then the stain was treated with lukewarm water and dabbed dry.

The results were similar to these of the coffee test.

On substrate A, the stain was completely removed.

On substrate B, the stain remained visible for 70%.

On substrates C and D, the stain remained visible for 20% to 40%, but a further treatment with chlorinated water was needed, which left a pale stain.

Test 4: Kool-aid test

With the same testing material as for the test 2, a kool-aid stain was made on the substrate. The stain was made with a solution of 95 g/l kool-aid in tap water. After 24 hours, the stain was treated with cold water and dabbed dry.

On substrate A, the stain was completely removed.

On substrate B, the stain was still present for 90%.

On substrate C, the stain was still present for 80%.

On substrate D, the stain was almost completely removed.

Test 5: Chlorine test

With a pipette, 2 ml of a solution of respectively 1 g/l, 3 g/l and 10 g/l active chlorine was brought on the substrate. After 24 hours the stains were visually evaluated.

5 On substrate A, no discoloration was noticed for 1 g/l and 3 g/l. The solution of 10 g/l had caused a slight discoloration.

On substrate B, there was already a discoloration at 1 g/l.

On substrate C, no discoloration was noticed at 1 g/l and 3 g/l. The solution of 10 g/l caused a very clear discoloration.

10 On substrate D, there was already a discoloration at 1 g/l. It has to be noticed, that a clear difference of discoloration was observed between substrate A and substrate C as of 7 g/l active chlorine.

On substrate B and D a complete discoloration was noticed at 3 g/l and with 10 g/l the substrate was affected.

This test proved that the treatment according to the invention not only protects the colour of the substrate against chlorine, but also gives a protection against the destruction of the substrate itself.

20

Test 6: Repeated stains

The coffee test (test 2) was repeated several times on the same spot of the substrate, and each time, the stain was treated with lukewarm water.

25 On substrate A, the coffee stain disappeared after five times (repeated stains) without leaving any trace. When the stain was made on the same spot for the sixth time, there was a slight discoloration visible after treatment with lukewarm water.

30 Test 7: Light fastness

A part of substrate A was exposed to light according to the DIN norm 54004, corresponding to ISO norm 105/BO2 (Xenontest).

The stain resistance test (test 2) as described above, was done on the exposed part after 24 hours of exposure to light, after 48 hours, after 72 hours... till after 240 hours of exposure.

5 The effectiveness of the stain removing treatment was compared with a non exposed part of substrate A. There was no difference noticed between the non exposed and the part exposed to light, even after 240 hours of exposure.

10 The same test was repeated on substrates A and B and the colour fastness of both substrates was compared after 240 hours of exposure. No colour difference was noticed. Therefore it can be stated that the treatment according to the invention has no influence on the colour fastness.

15 An additional test showed that for a substrate on the basis of polyamide dyed with a basic dyestuff the light fastness was substantially improved.

Test 8: Shampoo test

20 A part of substrate A was treated with a neutral carpet shampoo (Belgian Norm NBB: G62-014). The shampoo was mixed with water and the foam brought on the substrate with a brush. The shampoo was left to dry on the carpet and then removed with a vacuum cleaner.

25 After this treatment, test 2 as described above, was done on the cleaned part and compared to a part of substrate A not treated with shampoo. No substantial difference was noticed. This shampoo treatment did not affect the effectiveness of the stain-removing treatment.

30 This test was repeated five times, and showed that even after five shampoo treatments, the stain caused by hot coffee, still was completely removable without leaving any traces.

Example 2

Example 1 was repeated but on a substrate (E) consisting of polyamide 6 in the form of a bulked continuous filament.

Comparative trials 1a, 1b and 1c were also repeated on substrates (F) (G) and (H), which were identical with substrate (E).

5 In comparative trial 2a a substrate (F) was treated as in example 2 but without the tannic acid component and without the sulphon component.

In comparative trial 2b a substrate (G) was treated as in example 2 but with the tannic acid component and without the sulphon component.

10 In comparative trial 2c a substrate (H) was treated as in example 2 but with the sulphon component and without the tannic acid component.

The tests 1 to 4 as given for example 1 were also repeated and the results are summarised in table 1 hereafter. For test 5 only the 3 g/l active chlorine was tested.

15

Example 3

Example 1 was repeated but on a substrate (K) consisting of thermofixed polyamide 6 bulked continuous filament in cut pile.

20 Comparative trials 3a, 3b and 3c were made on substrates (L) (M) and (N) but:

- (L) without tannic acid component and without sulphon component
- (M) with tannic acid component and without sulphon component
- (N) without tannic acid component and with sulphon component.

25 The tests 1 to 5 as given for example 1 were also repeated.

Example 4

30 In this example, the treatment according to the invention was applied in a continuous process but after that the substrate has been dyed.

A solution of tannic acid, Alguard NS, polyacrylic acid and acetic acid was prepared in concentrations and compositions as in example 1. The pH of the solution was 3.5.

This solution was poured over a piece of dyed polyamide 6 substrate (P) in the form of a textured continuous filament (as substrate E) and then steamed, rinsed and dried as in example 1.

Comparative trials 4a, 4b, 4c

5. Pieces of substrate (Q), (R), (S) from the same material as substrate (P) were post-treated with the same solution, but respectively:

- (Q) without tannic acid and without Alguard NS
- (R) without Alguard NS but with tannic acid
- 10 • (S) without tannic acid but with Alguard NS.

The tests 1 to 5 as given for example 1 were repeated.

Example 5

- 15 In this example, the substrate was dyed in a discontinuous process, and afterwards treated with the solution according to the invention.

- A piece of polyamide 6.6 substrate (T) in the form as substrate A (example 1) was dyed in the classic way with an acid dyestuff and rinsed. Thereafter the substrate was immersed in a bath
20 containing a solution of tannic acid, Alguard NS, and polyacrylic acid in concentrations and with composition as in example 1.

The bath was gradually heated till 80°C and kept at this temperature for about 20 minutes, then cooled, rinsed and dried.

25 Comparative trials 5a, 5b, 5c

Pieces of substrate (U), (V), (W) from the same material as substrate (T) were dyed in the same way, but respectively treated:

- (U) without tannic acid and without Alguard NS
- (V) without Alguard NS but with tannic acid
- 30 • (W) without tannic acid but with Alguard NS.

The tests 1 to 5 as given for example 1 were repeated.

Table 1

Substrate	1	2	3	4	5
A	0	100	100	100	0
B	100	20	30	10	100
C	30	80	80	20	0
D	100	60	60	95	100
E	0	100	100	100	0
F	100	20	30	30	100
G	25	95	95	60	0
H	100	30	30	100	100
K	0	100	100	100	10
L	100	20	30	30	100
M	35	70	90	50	30
N	100	30	30	100	100
P	0	100	100	100	0
Q	100	20	30	30	100
R	30	90	90	50	0
S	100	30	30	100	100
T	0	100	100	100	0
U	100	20	30	20	100
V	30	70	90	50	0
W	100	30	30	95	100

- Test 1 : Benzoylperoxide test : % discoloration
- 5 Test 2 : Coffee test : % of stain disappeared
- Test 3 : Red wine test : % of stain disappeared
- Test 4 : Kool-aid test : % of stain disappeared
- Test 5 : Chlorine test : % discoloration with 3 g active chlorine per litre.

It is obvious that the invention is not restricted to the described examples, but applies for any process by which a substrate is

treated with a tannic acid solution (whereby tannic acid is to be understood in a broad sense, as described hereabove) and a solution containing a condensation product of a sulphonated phenol- or naphthol-derivate with an aldehyde. This treatment can be done before,
5 during or after dyeing.

The examples were intentionally given with an identical mixture of tannic acid and Alguard NS, so that results could be better compared.

10 Additionally to the described tests, laboratory tests were made with coloured stains originating from different types of drinks and all results confirmed the improved resistance.

Furthermore tests were made with a tannic acid from other suppliers and did not show any difference, so that any available commercial product can be used. The molecular weight however is an
15 important factor, and it can be preferred to use a mixture of tannic acid with a low MW, and a tannic acid with a high MW.

Tests were also carried out with different other condensation products of a sulphonated phenol- or naphthol- derivate with aldehydes, with equal results.

20 Instead of Alguard NS, different Mesityl (Bayer) products, different Stainmaster (Du Pont de Nemours) products, Erional RF (Ciba), Matexil FA-SNX (Zeneca), Resist 80-20 (Sandoz), Intratex N (Crompton & Knowles), etc., can also be used.

The examples were given with use of different polyamide
25 substrates to demonstrate the results on the different characteristics of the fibres. As a matter of fact each polyamide has its own characteristics. So is PA 6 different from PA 6.6, is a PA with a continuous filament different from a PA with fibres in a spun yarn and that there are differences resulting from the manufacturing process,
30 for instance PA thermofixed or not thermofixed.

The method is described and illustrated on the hand of polyamide fibres, but can be used for a large range of other substrates such as wool, silk, cotton, cellulosic substrate as well as polyester, polypropylene, polyacrylonitrile fibres, modified or not, in the form of
35 polymers as well as in the form of copolymers or bicomponent

synthetic fibres. Tests made on various fibres confirmed the positive results.

5 It is clear that the treatment with the solution containing tannic acid and a condensation product of a sulphonated phenol- or naphthol derivate with an aldehyde, can be combined with other compounds used in the field of the textile industry to seek for additional properties.

10 The concentrations, temperatures and reaction times were determined by the man skilled in the art, according to the used reagentia, products, dyestuffs, production process, type of substrate, etc...

Also the choice of stabilizer, wetting agent and other auxiliaries will be made by the man skilled in the art, who will take care that the selected auxiliaries do not cause any undesired reaction
15 with the tannic acid component or the sulphon component or with any other product used.

CLAIMS

1. Method for improving the resistance, in particular to stains, of a substrate made out of natural or synthetic fibres, in particular polyamide, characterized in that the substrate is treated in an acid medium with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphthol-derivate with an aldehyde.
2. Method according to claim 1, characterized in that the substrate is treated with an aqueous solution containing 1 to 6% active component, preferably consisting of 40 to 80% tannic acid and 20 to 60% of a condensation product of a sulphonated phenol- or naphthol-derivate with an aldehyde.
3. Method according to claim 1, characterized in that the tannic acid has a relatively high molecular weight (≥ 1500).
4. Method according to claim 1, characterized in that the pH of the solution ranges between 2.5 and 4.5.
5. Method according to claim 1, characterized in that the substrate is treated before, during or after the dyeing process.
6. Method according to claim 1, characterized in that the substrate is treated in an additional operation after the substrate has been dyed.
7. Method according to claim 2, characterized in that to the aqueous solution, a stabilizer is added to avoid oxidation of the substrate and of the solution.
8. Method according to claim 2, characterized in that to the aqueous solution, a cross-linking agent is added, such as a

complexing agent for the tannic acid component and/or a compound reducing the solubility of the sulphon component.

9. Method according to claim 1, characterized in that
5 the substrate is treated separately with the tannic acid solution and with the solution containing the condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde.

10. Substrate with improved resistance to stains,
10 characterized in that it is treated in an acid medium with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde.

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

PCT

To:
NEEDLE & ROSENBERG, P.C.
Attn. Katz, Mitchell A.
999 Peachtree Street,
Suite 1000
Atlanta, GA 30309-3915
UNITED STATES OF AMERICA

MAKING SEARCH

Needle & Rosenberg

By pc Date 6/12/06
Reviewed DS Date 06/26/2006
Scanned _____

NOTIFICATION OF TRANSMITTAL OF
THE INTERNATIONAL SEARCH REPORT AND
THE WRITTEN OPINION OF THE INTERNATIONAL
SEARCHING AUTHORITY, OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 19133.0110P1	Date of mailing (day/month/year) 06/06/2006
International application No. PCT/US2006/002432	International filing date (day/month/year) 23/01/2006
Applicant SHAW INDUSTRIES GROUP	

FOR FURTHER ACTION See paragraphs 1 and 4 below

JUN 12 2006

1. ☒ The applicant is hereby notified that the international search report and the written opinion of the International Searching Authority have been established and are transmitted herewith.

Filing of amendments and statement under Article 19:

The applicant is entitled, if he so wishes, to amend the claims of the International Application (see Rule 46):

When? The time limit for filing such amendments is normally two months from the date of transmittal of the International Search Report.

Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 338.82.70

For more detailed instructions, see the notes on the accompanying sheet.

2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect and the written opinion of the International Searching Authority are transmitted herewith.
3. ☐ **With regard to the protest** against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

- ☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
- ☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. Reminders

Shortly after the expiration of **18 months** from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in Rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

The applicant may submit comments on an informal basis on the written opinion of the International Searching Authority to the International Bureau. The International Bureau will send a copy of such comments to all designated Offices unless an international preliminary examination report has been or is to be established. These comments would also be made available to the public but not before the expiration of 30 months from the priority date.

Within **19 months** from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase **until 30 months** from the priority date (in some Offices even later); otherwise, the applicant must, **within 20 months** from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of **30 months** (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the International Searching Authority



European Patent Office, P.B. 5818 Patentlaan 2
NL-2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Laura Fernández Gómez

NOTES TO FORM PCT/ISA/220

These Notes are intended to give the basic instructions concerning the filing of amendments under article 19. The Notes are based on the requirements of the Patent Cooperation Treaty, the Regulations and the Administrative Instructions under that Treaty. In case of discrepancy between these Notes and those requirements, the latter are applicable. For more detailed information, see also the *PCT Applicant's Guide*, a publication of WIPO.

In these Notes, "Article", "Rule", and "Section" refer to the provisions of the PCT, the PCT Regulations and the PCT Administrative Instructions, respectively.

INSTRUCTIONS CONCERNING AMENDMENTS UNDER ARTICLE 19

The applicant has, after having received the international search report and the written opinion of the International Searching Authority, one opportunity to amend the claims of the international application. It should however be emphasized that, since all parts of the international application (claims, description and drawings) may be amended during the international preliminary examination procedure, there is usually no need to file amendments of the claims under Article 19 except where, e.g. the applicant wants the latter to be published for the purposes of provisional protection or has another reason for amending the claims before international publication. Furthermore, it should be emphasized that provisional protection is available in some States only (see *PCT Applicant's Guide*, Volume I/A, Annexes B1 and B2).

The attention of the applicant is drawn to the fact that amendments to the claims under Article 19 are not allowed where the International Searching Authority has declared, under Article 17(2), that no international search report would be established (see *PCT Applicant's Guide*, Volume I/A, paragraph 296).

What parts of the international application may be amended?

Under Article 19, only the claims may be amended.

During the international phase, the claims may also be amended (or further amended) under Article 34 before the International Preliminary Examining Authority. The description and drawings may only be amended under Article 34 before the International Examining Authority.

Upon entry into the national phase, all parts of the international application may be amended under Article 28 or, where applicable, Article 41.

When?

Within 2 months from the date of transmittal of the international search report or 16 months from the priority date, whichever time limit expires later. It should be noted, however, that the amendments will be considered as having been received on time if they are received by the International Bureau after the expiration of the applicable time limit but before the completion of the technical preparations for international publication (Rule 46.1).

Where not to file the amendments?

The amendments may only be filed with the International Bureau and not with the receiving Office or the International Searching Authority (Rule 46.2).

Where a demand for international preliminary examination has been/is filed, see below.

How?

Either by cancelling one or more entire claims, by adding one or more new claims or by amending the text of one or more of the claims as filed.

A replacement sheet must be submitted for each sheet of the claims which, on account of an amendment or amendments, differs from the sheet originally filed.

All the claims appearing on a replacement sheet must be numbered in Arabic numerals. Where a claim is cancelled, no renumbering of the other claims is required. In all cases where claims are renumbered, they must be renumbered consecutively (Section 205(b)).

The amendments must be made in the language in which the international application is to be published.

What documents must/may accompany the amendments?

Letter (Section 205(b)):

The amendments must be submitted with a letter.

The letter will not be published with the international application and the amended claims. It should not be confused with the "Statement under Article 19(1)" (see below, under "Statement under Article 19(1)").

The letter must be in English or French, at the choice of the applicant. However, if the language of the international application is English, the letter must be in English; if the language of the international application is French, the letter must be in French.

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 19133.0110P1	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2006/002432	International filing date (day/month/year) 23/01/2006	(Earliest) Priority Date (day/month/year) 24/01/2005
Applicant SHAW INDUSTRIES GROUP		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 3 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of:

- ☒ the international application in the language in which it was filed
☐ a translation of the international application into _____, which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1(b))

b. ☐ With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.

2. ☐ **Certain claims were found unsearchable** (See Box No. II)

3. ☐ **Unity of invention is lacking** (see Box No III)

4. With regard to the **title**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

- ☒ the text is approved as submitted by the applicant
☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority

6. With regard to the **drawings**,

- a. the figure of the **drawings** to be published with the abstract is Figure No. _____
☐ as suggested by the applicant
☐ as selected by this Authority, because the applicant failed to suggest a figure
☐ as selected by this Authority, because this figure better characterizes the invention
- b. ☒ none of the figures is to be published with the abstract

INTERNATIONAL SEARCH REPORT

International application No

PCT/US2006/002432

A. CLASSIFICATION OF SUBJECT MATTER

INV. D06M15/244 D06M15/248 D06M15/256 D06M15/277 D06M23/04
D06M23/16

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06M

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 814 758 B1 (PACIFICI JOSEPH A ET AL) 9 November 2004 (2004-11-09) cited in the application the whole document	1-17
A	US 6 793 684 B1 (JARVIS ANTHONY NICHOLAS ET AL) 21 September 2004 (2004-09-21) claims	1
X	US 5 520 962 A (JONES, JR. ET AL) 28 May 1996 (1996-05-28) column 1, line 10 - line 54 column 2, line 4 - line 8 examples 20h-20k	1-4, 6, 9-13
X	US 5 137 759 A (VINOD ET AL) 11 August 1992 (1992-08-11) example VII	1, 16, 17

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *G* document member of the same patent family

Date of the actual completion of the international search

26 May 2006

Date of mailing of the international search report

06/06/2006

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Koegler-Hoffmann, S

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2006/002432

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6814758	B1	09-11-2004	NONE	
US 6793684	B1	21-09-2004	AU 7785500 A	10-05-2001
			BR 0014458 A	25-02-2003
			CA 2386275 A1	12-04-2001
			CN 1402774 A	12-03-2003
			WO 0125387 A1	12-04-2001
			EP 1216292 A1	26-06-2002
			ZA 200202530 A	28-03-2003
US 5520962	A	28-05-1996	AT 202956 T	15-07-2001
			AU 702210 B2	18-02-1999
			AU 6380096 A	04-09-1996
			DE 69613775 D1	16-08-2001
			DE 69613775 T2	08-05-2002
			DK 758928 T3	24-09-2001
			EP 0758928 A1	26-02-1997
			ES 2160809 T3	16-11-2001
			GR 3036871 T3	31-01-2002
			PT 758928 T	30-11-2001
			WO 9625240 A1	22-08-1996
US 5137759	A	11-08-1992	NONE	

PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

PCT

To:

see form PCT/ISA/220

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY (PCT Rule 43bis.1)

Date of mailing

(day/month/year) see form PCT/ISA/210 (second sheet)

Applicant's or agent's file reference
see form PCT/ISA/220

FOR FURTHER ACTION

See paragraph 2 below

International application No.
PCT/US2006/002432

International filing date (day/month/year)
23.01.2006

Priority date (day/month/year)
24.01.2005

International Patent Classification (IPC) or both national classification and IPC
INV. D06M15/244 D06M15/248 D06M15/256 D06M15/277 D06M23/04 D06M23/16

Applicant
SHAW INDUSTRIES GROUP

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. FURTHER ACTION

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:



European Patent Office
D-80298 Munich
Tel. +49 89 2399 - 0 Tx: 523656 epmu d
Fax: +49 89 2399 - 4465

Date of completion of
this opinion

see form
PCT/ISA/210

Authorized Officer

Koegler-Hoffmann, S

Telephone No. +49 89 2399-8611



**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2006/002432

Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of:
 - ☒ the international application in the language in which it was filed
 - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of international search (Rules 12.3(a) and 23.1 (b)).
2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
 - a. type of material:
 - ☐ a sequence listing
 - ☐ table(s) related to the sequence listing
 - b. format of material:
 - ☐ on paper
 - ☐ in electronic form
 - c. time of filing/furnishing:
 - ☐ contained in the international application as filed.
 - ☐ filed together with the international application in electronic form.
 - ☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

**WRITTEN OPINION OF THE
INTERNATIONAL SEARCHING AUTHORITY**

International application No.
PCT/US2006/002432

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	5,8,14,15
	No: Claims	1-4,6,9-13,16,17
Inventive step (IS)	Yes: Claims	
	No: Claims	1-17
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Box No. VIII Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

Re Item V.

1. Reference is made to the following documents:

- D1: US-B1-6 814 758 (PACIFICI JOSEPH A ET AL) 9 November 2004 (2004-11-09) cited in the application
- D2: US-B1-6 793 684 (JARVIS ANTHONY NICHOLAS ET AL) 21 September 2004 (2004-09-21)
- D3: US-A-5 520 962 (JONES, JR. ET AL) 28 May 1996 (1996-05-28)
- D4: US-A-5 137 759 (VINOD ET AL) 11 August 1992 (1992-08-11)

2. The current application relates to a method of making a nylon material resistant to staining (claim 1) and to a carpet comprising said nylon material (claim 16).

2.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 and 16 is not new in view of documents D3 and D4.

Document D3 discloses a method for treating carpet to enhance its stain resistance (see abstract; column 1, lines 5 to 55). According to examples 20h to 20k the nylon carpet is treated in a treatment bath comprising an anionic polymer/stain resistant composition. After rinse and extraction step a fluorochemical is applied (sprayed) (see columns 25 to 28).

Document D2 concerns improvements in and relating to the treatment of carpets (polyamide fibres) that improves their stain-resistancy. According to example VII a nylon carpet is treated in a bath containing a stain-blocker. The carpet is rinsed and topically treated with a fluorochemical compound.

Thus in view of documents D3 and D4 the subject matter of claims 1 and 16 does not fulfil the requirements of Articles 33(2) and 33(3) PCT.

Dependent claims 2-15 and 17 d6 not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of

novelty and/or inventive step (Article 33(2) and (3) PCT).

Re Item VII

The description of the present application contains the expression "incorporated herein by reference..". Thus, while describing the present invention, reference has been made to the content of another document which content, however, has not been included in the description of the present application. The examiner considers that this reference merely aims at indicating or acknowledging a relevant state of the art according to Rule 5.1(a)(ii) PCT.

Hence, a short comment on the corresponding document appears to sufficient. The comment, however, should be purely factual - Article 34.2(b) PCT.

If it is not necessary to know the content of said documents to carry out the present invention, the expression "..incorporated.." should be cancelled. Should the content or parts of the content of said documents be necessary for carrying out the present invention, the applicant must include in the description of the present application the necessary information taken from said documents, i.e. without contravening the requirements of Article 34.2(b) PCT. The description must contain all the essential features of the invention per se.

Re Item VIII

1. The term "exhaustible polymer composition" used in claims 1, 9 and 14 is vague and unclear and leaves the reader in doubt as to the meaning of the technical feature to which it refers, thereby rendering the definition of the subject-matter of said claims unclear, Article 6 PCT.

Reference is made to document D2 wherein an exhaustion agent is described. Said agent seems, however, not to fall within the scope of the term "exhaustible composition" as used in the current application.

2. Furthermore, in view of the examples, it seems to be necessary to use the stainblocker composition alone or in combination with the compound ii) (exhaustible

polymer composition). The use of the compound ii) alone is not described in the examples. Thus, the addition of the stainblocker composition seems to be essential (Article 6 PCT).

3. According to page 12 the exhaustible polymer composition can comprise the compositions disclosed in US 6 524 492. The compounds described in said document fall within the scope of the term "stainblocker composition" (Article 6 PCT).

4. Claim 16 claims a carpet comprising a nylon fiber. The reference to claim 15 is unclear. Furthermore, the fiber disclosed in claim 15 may also be an untreated fiber. Thus, claim 16 is unclear (Article 6 PCT).

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
)	
Dennis J. Jones, Jr.	)	Art Unit: 1751
)	
Application No. 10/627,945	)	Examiner: Ogden, N.
)	
Filing Date: July 24, 2003	)	Confirmation No. 3664
)	
For: METHODS OF TREATING AND)	
CLEANING FIBERS, CARPET YARNS)	
AND CARPETS)	

AMENDMENT AND RESPONSE

Mail Stop RCE
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer No. 23859

Sir:

This Amendment accompanies a Request for Continued Examination under 37 CFR § 1.114. In response to the Final Office Action dated July 27, 2005, please amend the above-referenced application as indicated and consider the following remarks.

Please amend the Attorney Docket No. to be 03269.0109U1.

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. In amendments to the claims, additions are represented by **bold underlining** and deletions are represented by ~~striketrough~~ or, in cases of five characters or fewer, by **[[double brackets]]**.

LISTING OF CLAIMS

1-44. (canceled)

45. (currently amended) An aqueous treating composition comprising tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), **based on the weight of the tannic acid**, wherein the tannic acid is present in the aqueous treating composition **in a concentration of from greater than 0 pbw** **[[at up]]** to about 0.5 pbw, based on a total weight of the aqueous treating composition.

46. (previously presented) The treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 2.0 pbw.

47. (previously presented) The treating composition of claim 45, wherein the tannic acid is present in the composition at from about 0.005 pbw to about 0.4 pbw.

48. (previously presented) The aqueous treating composition of claim 45 having a pH of less than about 3.0.

49. (previously presented) The aqueous treating composition of claim 45, further comprising:

- a) a stain resist compound;
- b) a crosslinking agent;
- c) a fluorochemical; or

d) an organosilicate material.

50. (previously presented) The aqueous treating composition of claim 49, wherein the stain resist compound is present and comprises:

- a) a polymer or copolymer of methacrylic acid;
- b) a phenolic resin;
- c) styrene-maleic anhydride copolymer; or
- d) an aqueous emulsion of polymerized monomers, wherein the monomers comprise (meth)acrylic acid, alkyl (meth)acrylic acid, and a substituted or unsubstituted styrene.

51. (previously presented) The aqueous treating composition of claim 49, wherein the stain resist compound is present at from greater than 0.0 pbw to about 2.0 pbw solids, based on a total weight of the aqueous treating composition.

52. (previously presented) The aqueous treating composition of claim 49, wherein the crosslinking agent is present and comprises antimony potassium tartrate or stannous chloride.

53. (previously presented) The aqueous treating composition of claim 49, wherein the fluorochemical is present at from about 0.0001 pbw to about 5.0 pbw, based on a total weight of the aqueous treatment composition.

54-67. (canceled)

REMARKS/ARGUMENTS

Claims 45-53 are pending. Claims 1-44 were canceled by preliminary amendment dated October 26, 2004. Please cancel claims 54-67, without prejudice to file in a divisional application. Claim 45 has been amended herein.

The undersigned wishes to thank Examiner Ogden for the courtesies extended in the telephone interview on October 18, 2005, where the Office Action mailed July 27, 2005 and the pending claims were discussed. It is understood that the Examiner will be issuing an Interview Summary with regard to that discussion. Further, Examiner Ogden has asked Applicant to include a brief summary of the interview in the present Amendment and Response.

Brief Summary of Telephone Interview of October 18, 2005

Applicant summarized the prosecution history of the application. Examiner Ogden considered claim 45 and asserted that amendment to the tannic acid content range would clarify that the tannic acid is present in the aqueous composition. Examiner Ogden also asserted that claim 45, as written, was unclear as to whether the gallic acid content related to the tannic acid or to the aqueous composition.

Applicant noted that the Office Action mailed July 27, 2005, failed to set forth a proper rejection based upon inherency, but stated that submission of evidence of non-inherency would be preferable to appeal. Applicant offered to submit publicly-available technical specifications of commercially-available tannic acids showing that the recited limitation of gallic acid content was not inherent in commercially-available tannic acids. Examiner Ogden noted that this was the type of evidence that could be persuasive as to lack of inherency and agreed to consider the publicly-available technical specifications of commercially-available tannic acids.

Elected and Withdrawn Claims

The Office Action mailed July 27, 2005, erroneously states that claims 46-53 have been withdrawn. Review of the prosecution history indicates that claims 45-53 were elected and that

claims 54-67 have been withdrawn from further consideration as being drawn to a non-elected invention. Applicant, therefore, assumes that the statement in the Office Action mailed July 27, 2005, contains a typographical error and that claims 54-67, not claims 46-53, were withdrawn. This agrees with the listing on the Office Action Summary page.

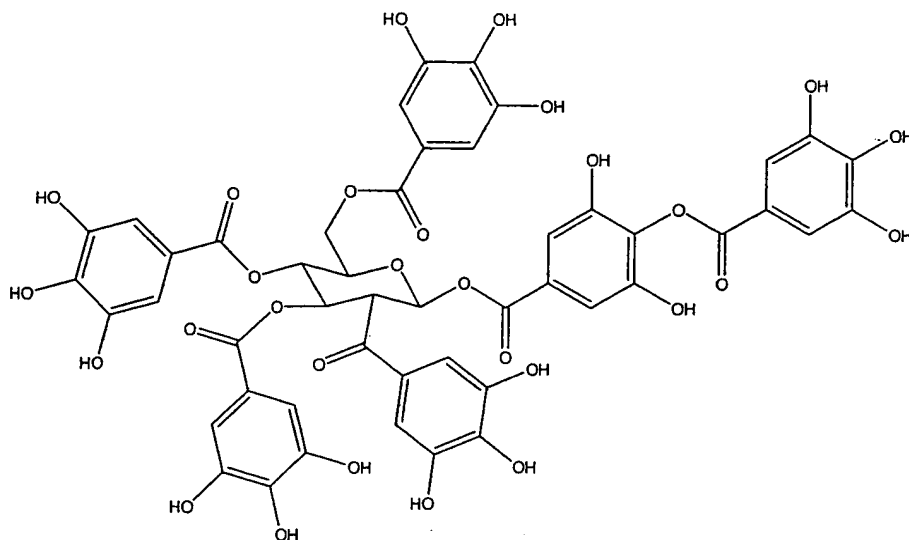
Claim Amendments

Claim 45 has been amended herein to recite an aqueous treating composition comprising tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), based on the weight of the tannic acid, wherein the tannic acid is present in the aqueous treating composition in a concentration of from greater than 0 pbw to about 0.5 pbw, based on a total weight of the aqueous treating composition. The element "based on the weight of the tannic acid" has been added to clarify that the gallic acid content is relative to the weight of tannic acid in the aqueous composition. The element "the tannic acid is present in the aqueous treating composition in a concentration of from greater than 0 pbw to about 0.5 pbw" has been amended to clarify that tannic acid is present in the aqueous composition.

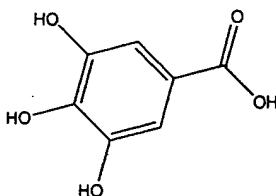
Claim rejections under 35 U.S.C. § 102

The Office Action has maintained the rejection of claim 45, and various dependent claims, under 35 U.S.C. § 102(b) as allegedly being anticipated by U.S. Patent No. 4,842,646 to Gamblin ("Gamblin") or by U.S. Patent No. 5,738,688 to DeLathauwer ("DeLathauwer") because each reference discloses an aqueous composition comprising, *inter alia*, a tannic acid.

Tannic acids are well known in the art and comprise compounds derived from nutgalls having a structure of polygalloylglucose or polygalloylquinic acid. Tannic acid can have, for example, the following structure:



Gallic acid is one component of tannic acid that can be present in commercially-available tannic acids and has the following structure:



To anticipate a claim under 35 U.S.C. §102(b), each and every element of the claim must be disclosed in the cited reference. MPEP § 2131 (citing *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987) (“A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.”) and *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989) (“The identical invention must be shown in as complete detail as is contained in the ... claim.”)).

Amended claim 45 recites “tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), based on the weight of the tannic acid.” In contrast, both Gamblin and DeLathauwer fail to disclose tannic acid having a gallic acid content of less than about 3.0 parts by weight. The general disclosure of “tannic acid” does not anticipate the presently claimed

tannic acid having the recited content of gallic acid. *See Akzo N.V. v. International Trade Comm.*, 808 F.2d 1471 (Fed. Cir. 1986) (holding that a prior art disclosure of sulfuric acid did not anticipate a claim reciting 98% sulfuric acid).

Further, the disclosure of a tannic acid having a gallic acid content of less than about 3.0 parts by weight is not inherent in the disclosure of "tannic acid." To establish inherency, it must be clear that the missing descriptive matter (that is, at least the recited gallic acid content of tannic acid) is *necessarily present* in the thing described in the prior art reference. The mere fact that a certain thing may result from a given set of circumstances is insufficient to prove anticipation. *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999); *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). Indeed, inherency is not established by possibilities or probabilities. *Standard Oil Co. (Indiana) v. Montedison, S.p.A.*, 664 F.2d 356, 372 (3d Cir. 1981). Thus, to establish that the reference inherently anticipates the claimed invention, the Office Action must show that the general teaching of "tannic acid" in the reference must mean tannic acid with less than 3.0 pbw gallic acid, without question and without variability. *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990) ("In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the allegedly inherent characteristic necessarily flows from the teachings of the applied prior art."). The Office Action has not established that allegedly inherent characteristic (*i.e.*, a gallic acid content of less than about 3.0 parts by weight) necessarily flows from the teaching (*i.e.*, "tannic acid") of the cited references.

Even further, a gallic acid content of less than about 3.0 parts by weight cannot be shown to be inherent in the teaching "tannic acid." Specifically, it is well-known from publicly-available technical specifications of commercially-available tannic acids that the recited limitation of gallic acid content is not inherent in commercially-available tannic acids. For example, Wins Globe Machine Equipment Trading Company offers for sale a tannic acid for dye applications having a gallic acid content of 5% (available at <http://www.winsglobe.com/hgcpyw.htm> and attached hereto as Exhibit A). As another example, Chongqing Foreign Trade East Asia Corporation offers for sale a tannic acid for dyestuff uses having a gallic acid content of <7%

(available at <http://www.eaco.com.cn/html/tannic%20acid/tannic%20acid.htm> and attached hereto as Exhibit B).

Accordingly, the disclosure of "tannic acid" cannot anticipate a tannic acid having a gallic acid content of less than about 3.0 parts by weight and, therefore, the cited references cannot anticipate amended claim 45, because they are silent with respect to the gallic acid content of tannic acid. Likewise, because claims 46-53 depend from amended claim 45, claims 46-53 also include the "gallic acid content of less than about 3.0 parts by weight" feature and, therefore, cannot be anticipated by the cited references.

Moreover, the Gamblin reference does not render the claimed composition obvious. Specifically, the cited reference provides no motivation or suggestion to use "a tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), based on the weight of the tannic acid" to practice its disclosed methods. *See* MPEP § 2143 ("The teaching or motivation to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure.") (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)).

Instead, rather than teaching that the gallic acid content of the tannic acid can be less than about 3.0 parts by weight, Gamblin discourages one of ordinary skill in the art from using a tannic acid having a gallic acid content of less than about 3.0 parts by weight by disclosing that gallic acid can be used interchangeably with tannic acid:

Tannic acid is readily available and relatively inexpensive and is, therefore, a preferred mordant. Other mordants may be prepared by reacting formaldehyde with phenol or salicyclic acid or by reacting sulfur with phenols. Most such mordants are proprietary materials and, generally, their structures are not known. Tamolan A (available from BASF), discussed above, may be a reaction product of sulphur and phenol. Other fixing agents similar to tannic acid (e.g., gallic acid) may also be used.

U.S. Patent No. 4,842,646; column 6; lines 22-31.

There is, therefore, no motivation in Gamblin to use a tannic acid having a gallic acid content of less than about 3.0 parts by weight, and Gamblin cannot render obvious amended claim 45, or those claims dependent upon amended claim 45 (*i.e.*, claims 46-53).

Furthermore, the DeLathauwer reference does not render the claimed composition obvious. That is, DeLathauwer provides no motivation or suggestion to use “a tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), based on the weight of the tannic acid” to practice its disclosed methods. In fact, instead of teaching that the gallic acid content of the tannic acid can be less than about 3.0 parts by weight, DeLathauwer discourages one of ordinary skill in the art from using a tannic acid having a gallic acid content of less than about 3.0 parts by weight by disclosing that “[a]ccording to the invention, any commercial tannic acid can be used,” (*see* U.S. Patent No. 5,738,688; column 2; lines 66-67) presumably including the commercially-available tannic acids of Exhibits A and B, which do not have a gallic acid content of less than about 3.0 parts by weight.

Like Gamblin, DeLathauwer fails to provide motivation to use a tannic acid having a gallic acid content of less than about 3.0 parts by weight. Therefore, DeLathauwer cannot render obvious amended claim 45, or those claims dependent upon amended claim 45 (*i.e.*, claims 46-53).

Rejection under 35 U.S.C. § 103(a)

Claims 51 and 53 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 5,738,688 to DeLathauwer (“DeLathauwer”).

Claims 51 and 53 depend from claim 45 and, therefore, also recite the feature “tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), based on the weight of the tannic acid.” As set forth above, DeLathauwer cannot render obvious this feature because, *inter alia*, it fails to disclose or suggest tannic acid having a gallic acid content of less than about 3.0 parts by weight. Therefore, DeLathauwer cannot render obvious claim 51 or claim 53.

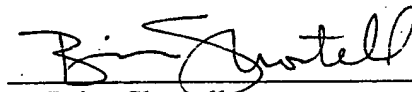
CONCLUSION

In light of the above arguments and amendments, the claims are believed to be allowable, and Applicant respectfully requests notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance.

Payment in the amount of \$790.00 for the Request for Continued Examination is enclosed herewith. The payment is to be charged to a credit card and is authorized by the signed, enclosed document entitled: Credit Card Payment Form PTO-2038. No further fee is believed due. However, the Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

NEEDLE & ROSENBERG, P.C.



D. Brian Shortell
Registration No. 56,020

NEEDLE & ROSENBERG, P.C.
Customer Number 23859
(678) 420-9300
(678) 420-9301 (fax)

CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence, including any items indicated as attached or included, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop RCE, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.


D. Brian Shortell

Oct. 26, 2005
Date

EXHIBIT A



云博弘方机械设备进出口贸易有限公司

WINS GLOBE MACHINE EQUIPMENT TRADING CO., LTD.

Home		About us	Chemical product	Machine product	Contact us
Tannic Acid	low residue (industry)	Technology index : Description : light brownish powdermoisture: 8.30% residue : 0.89% purity : 81.05% package : A net weight of 25kg packed in woven plastic bags.			
Tannic Acid	Food additive	Synonym : Tannin, Gallotannic acidMol.form and Mol.wt : C76H52O46 ;1701.18Description : light yellowish to brownish powder, Soluble in 1 part of water or alcohol;soluble in acetone; almost insoluble in chloroform or aether. Specification : correspond the require of standard of food chemistry criterion published by American food and drug administration, the 2th edition Technology index : experiment of resin or dextrin : up to grade ; heavy metal(Pb) %, ≤ 0.002 dry loss% ≤ 9.0 ; As% ≤ 0.0002 ignition residue % ≤ 1.0 Uses : clarificant for beer or liquor, used in the process of pineapple protease , etc. Storage : kept in a well-closed container, protected from light Package : A net weight of 500g packed in woven plastic bags. Outside package is carton, 40bag \times 500g.per box.			
Tannic Acid	dye	Mol.form and Mol.wt : C76H52O46 ;1701.18 Description : light yellowish to brownish powder, Soluble in 1 part of water or alcohol; soluble in acetone; almost insoluble in chloroform or aether. Technology index : dry loss : 6.0% chroma : 1.0% residue : 2.0% purity : 82% gallic acid content : 5% package : A net weight of 25kg packed in woven plastic bags.			
Tannic Acid	industry	Mol.form and Mol.wt : C76H52O46 ;1701.18 Description : light yellowish to brownish powder, Soluble in 1 part of water or alcohol; soluble in acetone; almost insoluble in chloroform or aether. Technology index : dry loss % ≤ 9.0 content that can not dissoluble in water % ≤ 0.3 solution colour ≤ 10 content ≥ 81.0 uses : widely used in abstract of Ge, manufacture of "Iro ink", anti- corrosion of metal, treatment of slurry in petroleum well, materials of pharmacy industry.			
Tannic Acid	Reagent	Synonym : Tannin, Gallotannic acid Mol.form and Mol.wt : C76H52O46 ;1701.18 Description : light yellowish to brownish powder, Soluble in 1 part of water or alcohol; soluble in acetone; almost insoluble in chloroform or aether. Specification: correspond the USA standard of chemical reagent (Lawson V. edition), Japanese standard of reagent specification K8929. Technology index : solubility in water: accordignition residue: ≤ 0.10 heavy metal (Pb) : 0.002%experiment of resin or dextrin : up to gradedry loss % ≤ 12.0 uses : can be used in the analytical determination of Ga, Ge, Ta, Ni, W, Ur, etc., to manufacture "Iro ink", act as the clarificant of liquor , as a mordant in dyeing .It is also widely used in pharmaceutical industry. package : A net weight of 250g packed in woven plastic bags. Outside			
Tannic Acid	medicine	Synonym : Tannin, Gallotannic acidMol.form and Mol.wt : C76H52O46 ;1701.18Description : light yellowish to brownish powder, Soluble in 1 part of water or alcohol; soluble in acetone; almost insoluble in chloroform or aether.Specification : correspond the standard of Chinese health ministry and USA pharmacopoeia(1990 edition) Technology index : As ≤ 3 ppmsolubility in water: accordignition residue, % ≤ 0.2 heavy metal ≤ 30 ppmexperiment of resin or dextrin : up to gradedry loss, % ≤ 9.0 role and uses : antimicrobial, enzyme remover, astringent, can be used to produce bacteriophage, antidote in treatment of tinea and diarrhea. package : A net weight of 500g packed in plastic bags, outside package is glue wooden box, 40 \times 500g per box.. Exported products are packaged in round cardboard, 25kg per barrel. Medicament registered number: 黔卫药准字 (82) 352号.			

Tannic Acid	Chunyu an ellagic acid	<p>一、 Specifications:</p> <p>Item Standard Result Remark</p> <p>Appearance Brownish or greyest powder Greyest powder</p> <p>Ellagic acid content % ≥ 90 90</p> <p>Loss on drying % ≤ 5</p> <p>Ash content % ≤ 1.0</p> <p>Heavy metal (Pb) ppm ≤ 10</p> <p>Total bacterial count fu/g ≤ 1000 ≤ 1000</p> <p>二、 Usage</p> <p>1. Function of anticancer and antimutation</p> <p>The experiment shows: Ellagic acid has function of anticancer and antimutation. Ellagic acid and Other ellagic tannin has inhibitory action to immuno-deficiency virus and AMV reverse transcription enzyme and α- or β-cell DNA polymerase</p> <p>2. Ellagic acid has the function of antioxidation because it can chelate with metal and react with free radical it can prevent other substances from oxidating as a oxidant. It has used during the fruit wine to be matured and food to be processed. To prevent cooking oil and fat and methyl oleate and lard and bean oil from oxidating.</p> <p>三、 Packaging: 20kg/barrel</p>
----------------	------------------------------	---

Address: Room 301 No.4 Longtong Building Guizhou Road Heping District Tianjin China
Tel: 0086-22-23046976 Fax: 23046975 E-mail: administrator@winsglobe.com

EXHIBIT B

Chongqing Foreign Trade East Asia Corp.

[Home](#)

[Product](#)

[E-Mail](#)

Tannic acid

We are a leading manufacturer and supplier of Tannic Acid in China. We have exported our fellow products to Japan, European and USA since 1996. We can supply Tannic Acid in powder or in inflated powder.

►[Tannic Acid For Industrial Uses]

Other names: Tannin, Chinese gall tannic acid.

Properties : Light yellow to light brown powder, with a peculiar smell and taste very astringent;

Specifications: Comply with China national standard of GB5308-85.

Technical Data:

content of tannic acid $\geq 81\%$

weight loss after desiccation $\leq 9\%$

insoluble materials in water $\leq 0.6\%$

total color ≤ 2.0

Usage: For the extraction of germanium, the production of ink, rust prevented of metals, and mud treated in petroleum drilling, and as raw material for pharmaceutical industry.

Storage: Keep in airtight containers.

Package: In plastic bags, N.W. 25kg/bag.

▼[Tannic Acid For Dyestuff]

Properties: Light yellow to light brown powder, with a peculiar smell and taste very astringent; soluble in a portion of water or alcohol, as well as in acetone, soluble in chloroform or ether.

Technical Data:

weight loss after desiccation $\leq 10\%$

state in water below micro etch

light absorption > 420

content of gallic acid $< 7\%$

total color ≤ 1.0

Usage: In printing and dyeing of textiles, it is used as color fixer, polygenetic dye and fiber deodorizer.

Storage: Keep in airtight containers.

Package: In plastic bags, N.W. 25kg/bag.

➤[Tannic Acid For Medical Use]

Other names: Tannin, Chinese gall tannic acid.

Properties: Light yellow to light brown powder, with a peculiar smell and taste very astringent;

Specifications: Comply with the British Pharmacopoeia(Ver. 1999) and the U.S. pharmacopoeia(Ver. 2004).

Technical Data:

content of tannic $\geq 86\%$

insoluble materials $\leq 0.2\%$

weight loss after desiccation $\leq 9\%$

clearness of water up to standard

tree gum or dextrin up to standard

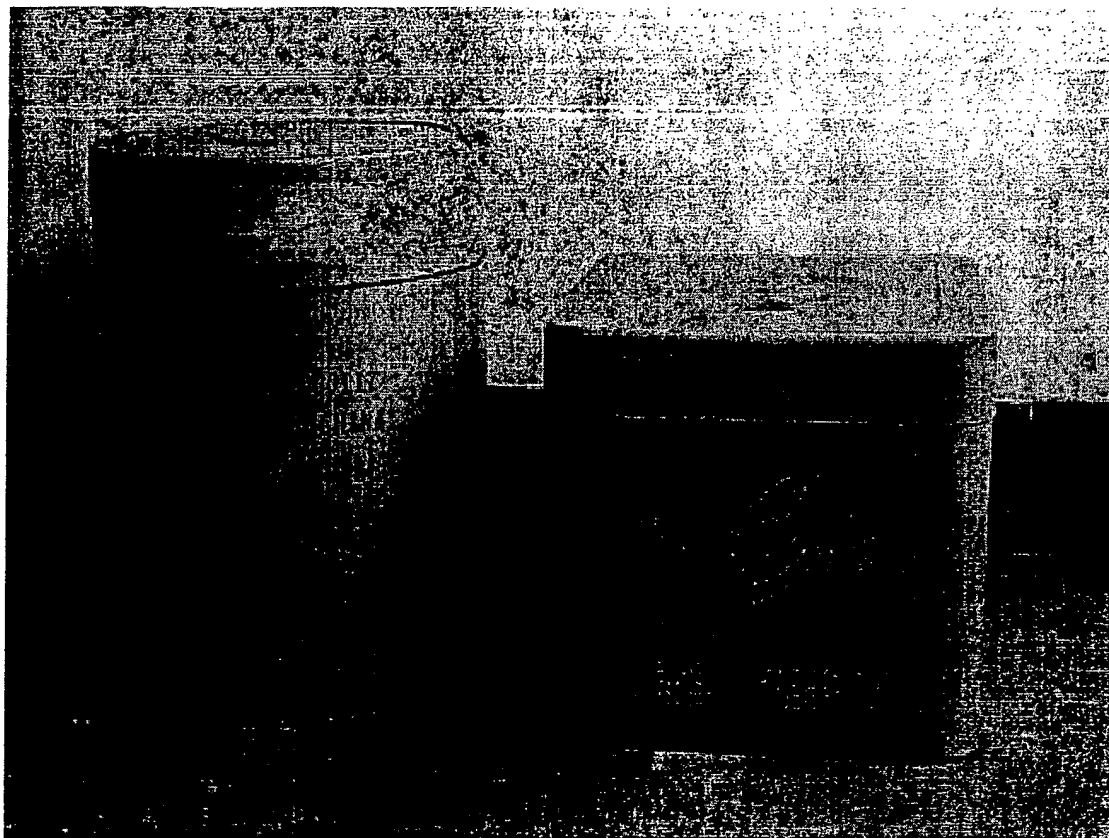
burn remains $\leq 0.2\%$

content of gallic acid $< 7\%$

Usage: For the preparations of antibiotics, treating tinea, clearing toxic material and stop dysentery, and also for synthesizing sulphanilamide synergist.

Storage: Keep in dark place and in airtight containers.

Package: In plastic bags, N.W. 25kg/bag; In bottles: 500g/bottle or 250g/bottle.



►[Tannic Acid For Food]

Other names: Tannin, Chinese gall tannic acid.

Properties: Light yellow to light brown powder, with a peculiar smell and taste very astringent.

Technical Data:

weight loss after desiccation $\leq 9\%$

content of tannic $\geq 86\%$

burn remains $\leq 0.2\%$

arsenic $< 3\text{PPm}$

heavy metal $< 0.004\%$

insoluble materials $\leq 0.2\%$

tree gum or dextrin test up to standard

resin test up to standard

Usage: As the antioxidant and antiseptic for foods, clearer for beverages and wines, and decolorant for soy sauce.

Storage: Keep in dark place and in airtight containers.

Package: In plastic bags, N.W. 25kg/bag; In bottles: 500g/bottle or 250g/bottle.

►[Tannic Acid For Brewage]

Other names: Tannin, Chinese gall tannic acid.

Properties: Light yellow powder, with a peculiar smell and taste very astringent.

Technical Data:

weight loss after desiccation $\leq 9\%$

content of tannic $\geq 96\%$

burn remains $\leq 0.2\%$

arsenic $< 3\text{PPm}$

heavy metal $< 0.004\%$

insoluble materials $\leq 0.2\%$

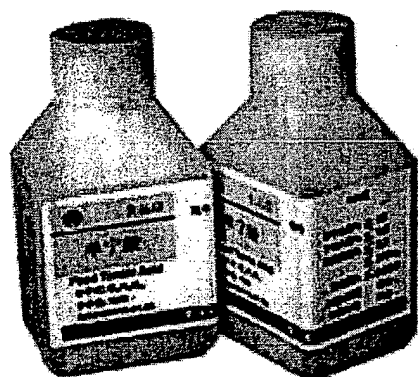
tree gum or dextrin test up to standard

resin test up to standard

Usage: As the antioxidant and antiseptic for foods, clearer for beer, beverages and wines, and decolorant for soy sauce.

Storage: Keep in dark place and in airtight containers.

Package: In Box : N.W. 25kg/box; In bottles: 500g/bottle or 250g/bottle.



ADD : B4-3-1, 29, West Huahuiyuan Rd., Yubei, Chongqing, China

Post Code : 401147

Tel : 86-23-6790 8775, 86-23-6790 8771

Fax : 86-23-67907249

Email : gaoweicq@online.cq.cn

Website : <http://www.eaco.com.cn>



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,945	07/24/2003	Dennis J. Jones JR.	60073.0004US01	3664
23859	7590	01/11/2006	EXAMINER	
NEEDLE & ROSENBERG, P.C.			OGDEN JR, NECHOLUS	
SUITE 1000			ART UNIT	
999 PEACHTREE STREET			PAPER NUMBER	
ATLANTA, GA 30309-3915			1751	

DATE MAILED: 01/11/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,945

Applicant(s)

JONES, DENNIS J.

Examiner

Necholus Ogden

Art Unit

1751

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 October 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 45-53 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 45-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 10-28-2005 has been entered.

Response to Amendment

Claims 45-53 are pending and claims 54-67 are canceled.

Oath/Declaration

2. This application presents a claim for subject matter not originally claimed or embraced in the statement of the invention. Applicant submitted a preliminary amendment filed 10-26-2004, which is not a part of the original disclosure and further contains new matter. Therefore, a supplemental oath or declaration is required under 37 CFR 1.67. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01, 602.02 and 608.04(b).

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Art Unit: 1751

4. Claims 45 and 53 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

5. Claim 45 states the phrase "in a concentration of from greater than 0 pbw" wherein said phrase is not disclosed in the specification and may include proportions not described by applicant at the time the application was filed.

6. Claim 45 further states that the gallic acid content is "based on the weight of tannic acid", which is considered by the examiner to be a new matter statement. Applicant is correct in stating that during the interview this question was raised and the examiner suggested clarifying the matter, however, it is the examiner opinion that the specification is clear that the gallic acid content is based on the tannic acid and the skilled artisan would reasonably infer the weight of the composition comprising the tannic acid having a gallic acid content of less than 3 is supported by the specification. Therefore, the amended phrase is redundant and raises the issue of new matter.

7. Claim 53 states the phrase "0.0001 pbw to about 5.0 pbw", wherein said phrase is not disclosed in the specification and may include proportions not described by the applicant at the time the application was filed.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

11. Claims 45-50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Lathauwer (5,738,688).

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De Lathauwer discloses a method of treating fibers or yarns comprising applying compositions containing tannic acid in an amount from 0.01 to 0.9% by weight of the acid content (col. 2, line 23) and potassium antimony tartrate (col. 3, lines 39-40). De Lathauwer further teaches that said composition may contain condensation products of sulphonated phenols (col. 2, lines 24-25) and polyacrylic acids (col. 3, line 23) and that the compositions have a pH of between 2.5 to 5.

De Lathauwer is silent with respect to the gallic acid content.

It would have been obvious to one of ordinary skill in the art, absent a showing to the contrary, to optimize the gallic acid content limitation of tannic acid because the prior art of record teaches and invites the inclusion of any commercial tannic acid. For it is held that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382.

12. Claims 45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gamblin (4,482,646).

Gamblin discloses an ink or dye bath comprising 0.0001% by weight of tannic acid and 25 to 100% by weight of water (col. 3, lines 53-67).

Gamblin is silent with respect to the gallic acid content.

It would have been obvious to one of ordinary skill in the art to optimize, absent a showing to the contrary, the gallic acid content limitation of tannic acid because optimization of components is within the level of ordinary skill. Moreover, it is held that

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"The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382.

13. Claims 45-47 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fekete (4,0984,701).

Fekete discloses an aqueous composition for cleaning tin surfaces comprising tannic acid in an amount from 0.01% by weight and greater (see col. 3, lines 1-8 and examples).

Fekete is silent with respect to the gallic acid content.

It would have been obvious to one of ordinary skill in the art to optimize, absent a showing to the contrary, the gallic acid content limitation of tannic acid because optimization of components is within the level of ordinary skill. Moreover, it is held that "The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382.

14. Claim 51 and 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over De Lathauwer (5,738,688) in view of Jones, Jr. (5,520,962).

Jones, Jr. discloses a method and composition for increasing the repellency on carpet and carpet yard comprising fluorochemicals in the amount from 0.0035 and 0.175 wt. of the solids (col. 3, lines 20-26).

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Absent a showing to the contrary, It would have been obvious to one of ordinary skill in the art to incorporate the fluorochemicals taught by Jones, Jr. into the compositions taught by De Lathauwer because it is well known in the art to apply fluorochemicals coatings to nylon fabrics to provide stain repellency and De Lathauwer main objective is to improve stain resistance on fibers (see abstract).

Double Patenting

15. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

16. Claims 45-53 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 62-67 of U.S. Patent No. 5,520,962 in view of De Lathauwer (5,738,688). The claims overlap in subject matter pertaining to composition to treat stains comprising a stain resistant compound and De Lathauwer teaches that tannic acid aids in improving repellency. Therefore, the skilled artisan would have been motivated to include tannic acid to aid in stain resistance.

Response to Arguments

17. Applicant's arguments filed 10-28-2005 have been fully considered but they are not persuasive.

Applicant argues that Gamblin or De Lathauwer do not suggest the gallic acid content of the claimed invention.

The examiner contends that the gallic acid content of the tannic acid components of Gamblin or De Lathauwer are silent, however, the burden is upon applicant to prove otherwise and it well known to the skilled artisan to optimize percentages, since gallic acid is acquired by the hydrolysis of tannic acid it would have been within the level of the skilled artisan to arrive at the gallic acid content absent a showing to the contrary commensurate in scope with the claimed invention. Moreover, by stating that any commercially available tannic acid can be used is a reasonable assumption that tannic acids of a range of gallic acid contents could be employed in a beneficial or synergistic manner.

"The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382.

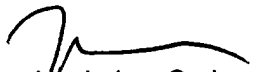
Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Necholas Ogden whose telephone number is 571-272-1322. The examiner can normally be reached on M-Th.

Art Unit: 1751

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra N. Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Nicholas Ogden
Primary Examiner
Art Unit 1751

No

1-7-2006

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of)	
)	
Dennis J. Jones, Jr.	)	Art Unit: 1751
)	
Application No. 10/627,945	)	Examiner: Hamlin, D.
)	
Filing Date: July 24, 2003	)	Confirmation No. 3664
)	
For: METHODS OF TREATING AND)	
CLEANING FIBERS, CARPET YARNS)	
AND CARPETS)	

REQUEST FOR RECONSIDERATION

Via Facsimile No. (703) 872-9306
Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer Number 23859

Sir:

This is a Request for Reconsideration in response to the Office Action dated December 17, 2004. A Request for One (1) Month Extension of Time is included herewith thereby extending the due date until April 17, 2005. The requisite extension of time fee of \$120.00 is included herewith.

REMARKS

The undersigned wishes to thank Examiner Hamlin for the courtesies he has extended in the telephone interview on March 4, 2005 where the present Office Action was discussed. It is understood that the Examiner will be issuing an Interview Summary with regard to that

discussion. If not, it is respectfully requested that the Examiner notify the undersigned of the requirement to submit an Applicant's Interview Summary.

A. Acknowledgement of Restriction Requirement and Election

Applicant confirms the provisional election made with traverse to prosecute the invention of Group 1, Claims 45-53. Applicant further acknowledges that Claims 54-67 have been withdrawn from further consideration as being drawn to a non-elected invention.

B. Claim rejections under 35 U.S.C. § 102

The Office Action has rejected claims 45-47 under 35 U.S.C. § 102(b) as allegedly being anticipated by Gamblin, U.S. Patent No. 4,842,646 ("Gamblin"). In particular, it is alleged in the Office Action that Gamblin discloses a textile dye with the following preferred embodiment of an aqueous ink or dye bath comprising:

- a) about 0.0001 to about 15 parts by weight of a water insoluble nigrosine dye, induline dye or basic dye; b) about 0.0001 to about 60 parts by weight of a hydroxycarboxylic acid having at least three hydroxyl groups; c) about 0.0001 to about 60 parts by weight of a water miscible solvent; d) about 25 to about 100 parts by weight of water; and optionally, e) about 0.0001 to about 30 parts by weight of a mordant (e.g., tannic acid or gallic acid, preferably tannic acid). (col. 3, lines 50-68).

The Office Action thereby alleges that Gamblin anticipates the present invention as a result of this disclosure.

The Office Action further alleges that claims 45-50 and 52 are anticipated under 35 U.S.C. § 102(b) by DeLathauwer *et al.*, U.S. Patent No. 5,738,688 ("DeLathauwer"). While the Office Action sets forth a detailed description of the basis of the anticipation rejection, the basis of the rejection is that DeLathauwer *et al.* discloses the use of tannic acid in acidic medium for treatment of textile fibers.

The anticipation rejections in view of Gamblin and DeLathauwer can be addressed together. Neither of these references discloses a tannic acid having less than about 3% parts by weight gallic acid. Indeed, Gamblin uses tannic acid *or* gallic acid, which indicates that Gamblin does not recognize that gallic acid can be in tannic acid in any amount. (*See e.g.*, col. 3, line 5.) Further, DeLathauwer states that “any commercial tannic acid can be used, though it is economical to use a tannic acid with relatively high molecular weight.” (Cols. 2-3, lines 65-1.) From these disclosures, it is apparent that neither Gamblin nor DeLathauwer recognizes any gallic acid content in the tannic acids disclosed therein.

Applicant contends that any general disclosure of tannic acid that may be identified in a prior art reference will not anticipate the presently claimed tannic acid having the recited amount of gallic acid. In this regard, the Examiner’s attention is directed toward M.P.E.P. 2131.02 wherein *Akzo N.V. v. International Trade Comm*, 808 F.2d 1471 (Fed. Cir. 1986) is cited. In that case, the Federal Circuit held that a prior art disclosure of sulfuric acid did not anticipate a claim reciting 98% sulfuric acid. *Akzo* is analogous to the present situation in that neither Gamblin nor DeLathauwer teach or suggest the recited amount of gallic acid in the tannic acid. A copy of this case is included for the Examiner’s convenience.

To the extent that it will be contended that the claimed gallic acid content is inherent in Gamblin and/or DeLathauwer, Applicant contends that no prima facie case of inherency can be made out from these references.

To establish inherency, it must be clear that the missing descriptive matter (that is, at least the recited gallic acid content of tannic acid) is *necessarily present* in the thing described in the prior art reference. The mere fact that a certain thing may result from a given set of

circumstances is insufficient to prove anticipation. *In re Robertson*, 169 F.3d 743 (Fed. Cir. 1999); *Continental Can Co. v. Monsanto Co.*, 948 F.2d 1264, 1268 (Fed. Cir. 1991). Indeed, inherency is not established by possibilities or probabilities. *Standard Oil Co. (Indiana) v. Montedison, S.p.A.*, 664 F.2d 356, 372 (3d Cir. 1981). Thus, to establish that the reference inherently anticipates the claimed invention, the Office Action must show that the general teaching of “tannic acid” in the reference must mean tannic acid with less than 3% gallic acid, without question and without variability. This has not been shown in the Office Action. Because the recited gallic acid content does not necessarily follow from bare disclosure of tannic acid in the Gamblin and DeLathauwer references, the claimed invention is not inherently anticipated by these references.

Rejections under 35 U.S.C. § 103(b)

Claims 51 and 53 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over the DeLathauwer reference for the reasons set forth in the anticipation rejection. In particular, the Office Action states:

The reference does teach that a solution is formed and that methacrylic polymer are used, therefore there would be a reasonable expectation of success to modify the prior art to arrive at the instantly claimed invention because the prior art suggest a solution which by definition contains no solids and a polymer that is known to be mixed with a fluorochemical in the required amounts. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the instant composition in view of the reference.

Applicant respectfully requests clarification of the above grounds of rejection because it is not understood what aspects of DeLathauwer are being used to reject the claimed invention on obviousness grounds.

ATTORNEY DOCKET NO. 03269.0109U1
Application No. 10/627,945

In any event, as detailed above, DeLathauwer does not mention or suggest in any way the claimed gallic acid content of the tannic acid therein. Therefore, it is respectfully submitted that DeLathauwer does not render the present invention obvious for at least the reasons set forth above.

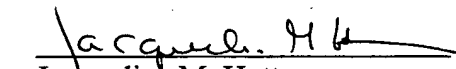
CONCLUSION

It is believed that the claims are in condition for allowance and Applicant respectfully seeks notification of same.

A Credit Card Authorization Form PTO-2038 in the amount of \$120.00 is enclosed to cover the fee for the One (1) Month Extension of Time. No additional fees are believed due; however, the Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

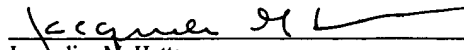
NEEDLE & ROSENBERG, P.C.


Jacqueline M. Hutter
Registration No. 44,792

NEEDLE & ROSENBERG, P.C.
Customer Number 23859
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(678) 420-9301 (fax)

CERTIFICATE OF FACSIMILE TRANSMISSION UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence, including any items indicated as attached or included, is being transmitted via facsimile transmission to: Examiner Hamlin, D., Art Unit 1751, (703) 872-9306 on the date indicated below.


Jacqueline M. Hutter

411103
Date

EXHIBIT

A

1 of 1 DOCUMENT

**AKZO N.V., ENKA B.V., ARAMIDE MAATSCHAPPIJ v.o.f. and AKZONA
INCORPORATED, Appellants, v. U.S. INTERNATIONAL TRADE
COMMISSION, Appellee, E.I. duPONT DE NEMOURS AND CO., Intervenor-
Appellee**

No. 86-877

UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT

*808 F.2d 1471; 1986 U.S. App. LEXIS 20737; 1 U.S.P.Q.2D (BNA) 1241; 1987-1
Trade Cas. (CCH) P67,529; 5 Fed. Cir. (T) 52*

December 22, 1986, Decided

PRIOR HISTORY: [1]**

Appealed from U.S. International Trade Commission.

LexisNexis(R) Headnotes

COUNSEL:

Denis McInerney, for Appellants. With him on the brief were David R. Hyde, Laurence T. Sorkin, George Wailand, P. Kevin Castel, C. Frederick Leydig, for Appellants. With him on the brief were Charles S. Oslakovic, John Kilyk, Jr., Norval B. Galloway. Also on the brief were Robert H. Falk, Tom M. Schaumberg, Cecilia H. Gonzalez.

Catherine Field, for Appellees. With her on the brief was Michael P. Mabile.

Daniel M. Gribbon, for Intervenor-Appellee. With him on the brief were Harris, Weinstein, James R. Atwood, Eugene D. Gulland, Dwight C. Smith, III, Stephen H. Marcus. Joseph M. Fitzpatrick, for Intervenor-Appellee. With him on the brief were John A. O'Brien, Henry J. Renk, Charles P. Baker, Laura A. Bauer, Bruce C. Haas.

JUDGES:

Markey, Chief Judge, Davis and Nies, Circuit Judges.

OPINIONBY:

DAVIS

OPINION:

[*1475] DAVIS, Circuit Judge.

This is an appeal by Akzo, N.V., Enka B.V., Aramide Maatschappij, v.o.f. and Akzona Inc. (appellants or Akzo) from an exclusion order by the United States International Trade Commission (Commission or trial tribunal) pursuant to §§ 337 and 337a of the Tariff Act of 1930, 19 U.S.C. § § 1337, [**2] 1337a (1982), prohibiting the importation into the United States of aramid fibers manufactured by Akzo in the Netherlands. We affirm.

I. Background; Issues; Scope of Review

A. Background. On April 18, 1984, E.I. du Pont de Nemours and Company (appellee or Du Pont) filed a complaint with the Commission under § 337 of the Tariff Act of 1930 (19 U.S.C. § 1337). n1 The complaint alleged that Akzo had engaged in unfair methods of competition and unfair acts including the importation, sale and marketing in the United States of certain aramid fibers n2 produced in the Netherlands by a process purportedly covered by the claims of Du Pont's U.S. Letters Patent No. 3,767,756 (the Blades or '756 patent). In addition, the complaint charged Akzo with attempting both to exploit applications of aramid fibers and to penetrate markets for aramid fibers created by Du Pont. Finally, the complaint alleged that the effect or tendency

808 F.2d 1471, *, 1986 U.S. App. LEXIS 20737, **;
1 U.S.P.Q.2D (BNA) 1241; 1987-1 Trade Cas. (CCH) P67,529

of the unfair methods of competition and unfair acts was to destroy or substantially injure an industry, efficiently and economically operated, in the United States.

n1 19 U.S.C. § 1337 (1976) provides in pertinent part:

Unfair practices in import
trade

(a) Unfair methods
of competition
declared unlawful

Unfair methods of competition and unfair acts in the importation of articles into the United States, or in their sale by the owner, importer, consignee, or agent of either, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and economically operated, in the United States, or to prevent the establishment of such an industry, or to restrain or monopolize trade and commerce in the United States, are declared unlawful, and when found by the Commission to exist shall be dealt with, in addition to any other provisions of law, as provided in this section.

[**3]

n2 As indicated in Part II, *infra*, aramid fibers are the strongest commercial synthetic fibers known to man -- about five times stronger than steel on an equal weight basis.

After evaluating Du Pont's complaint, the Commission instituted an investigation pursuant to § 337(b), 19 U.S.C. § 1337(b), and an administrative law judge (ALJ) was assigned to preside over the investigation.

The major substantive question before the ALJ (and now before us) is the validity and enforceability of Du Pont's Blades patent. Those issues, and the related facts and circumstances, are set forth and discussed in Part II, *infra*. The major procedural issue is whether Akzo was denied due process because Du Pont's confidential

documents were not disclosed to appellants' management. This problem (together with an alleged violation of treaty rights) is considered in Part III, *infra*. The other issues presented to us are dealt with in Part IV, *infra*.

Following 14 days of hearing, the ALJ issued an initial determination holding that [*1476] there was a violation of § 337(a) [**4] of the Tariff Act of 1930 in the unlawful importation or sale of certain aramid fibers produced overseas by means of a process that if practiced in the United States would infringe the Blades '756 patent, and that importation has the tendency to injure substantially an efficiently and economically operated industry in the United States.

Akzo filed a petition for review of the ALJ's initial determination on June 3, 1985. On July 15, 1985, the Commission decided to review only those portions of the initial determination pertaining to anticipation and obviousness of the Blades '756 patent under 35 U.S.C. § 102 and 103. Ultimately, the Commission affirmed the ALJ's findings and conclusions on anticipation and obviousness and determined that appellants had failed to prove the Blades '756 patent invalid. Having decided not to review the remainder of the initial determination, the Commission concluded that there was a violation of § 337. Accordingly, on November 25, 1985, the Commission, after further consideration, entered an exclusion order limited to certain forms of aramid fibers produced by Akzo. The Commission's order became final on January 25, 1986 when [**5] the President declined to overrule it pursuant to § 337(g).

B. *Issues*. On this appeal, Akzo raises a number of issues for us to resolve:

- (1) whether the Commission's finding that claim 13 of the '756 patent was "not invalid" and "not unenforceable" is supported by substantial evidence; n3
- (2) whether Akzo's due process and treaty rights were violated in the Commission proceeding;
- (3) whether the Commission, as a non-Article III tribunal, is constitutionally prohibited from adjudicating the validity and enforceability of patents;
- (4) whether the Commission's finding that Akzo's sales of aramid fibers in the United States would have a tendency to "destroy or substantially injure" an industry economically and efficiently operated is supported by substantial evidence;

(5) whether the Commission's conclusion that Du Pont's value-in-use pricing did not violate the antitrust laws is correct and supported by substantial evidence; and
(6) whether it is a defense to Du Pont's complaint that Du Pont employed a solvent included in a polymerization process patented by Akzo.

n3 Akzo presents no contention that, if claim 13 of the '756 patent is valid and enforceable, Akzo would not infringe if it used its same process in this country.

[**6]

C. *Scope of review.* This court defined our scope of review in cases appealed from the Commission in *Beloit Corp. v. Valmet OY, (Order)*, 742 F.2d 1421, 223 U.S.P.Q. (BNA) 193 (1984), cert. denied, 472 U.S. 1009, 105 S. Ct. 2706, 86 L. Ed. 2d 721 (1985). There we held that the court "does not sit to review what the Commission has not decided." 742 F.2d at 1423, 223 U.S.P.Q. (BNA) at 194. *Beloit* is distinguishable from this case because there the Commission specifically adopted only a portion of the presiding official's initial decision. See, e.g., *American Hospital Supply Corp. v. Travenol Laboratories, Inc.*, 745 F.2d 1, 5 n.13, 223 U.S.P.Q. (BNA) 577, 580 n.13 (Fed. Cir. 1984). In contrast, in the current case, the Commission merely determined not to review the remainder of the initial decision, choosing to conduct its own § 102 and 103 analysis. The Commission neither rejected any part of the initial determination nor did it say that it was taking no position on any part of it. Although the Commission limited its [**7] own review to patent validity under § 102 and 103, the fact that it affirmed the conclusion of the ALJ that there was a § 337 violation makes reviewable those conclusions of the ALJ necessary for the Commission to have determined (as it did) that there was a § 337 violation. Accord *Warner Brothers, Inc. v. U.S. International Trade Commission*, 787 F.2d 562, 229 U.S.P.Q. (BNA) 126 (Fed. Cir. 1986). This includes not only the § 102 and 103 issues of anticipation and obviousness, but also whether there was inequitable conduct before [*1477] the Patent Office and the other issues decided by the Commission and the ALJ. n4

n4 19 C.F.R. § 210.53(h)(1986) provides that "an initial determination . . . shall become the determination of the Commission . . . unless

the Commission . . . shall have ordered review of the initial determination or certain issues therein. . . ." In accepting the necessary conclusions of the ALJ we do not hold that the Commission must have concurred with each and every individual factual finding of the ALJ to support its conclusion.

[**8]

II. *Validity and Enforceability of the Blades Patent*

A. *The Invention.* n5 The Blades '756 patent, "Dry-Jet Wet Spinning Process," was issued on October 23, 1973 to Dr. Herbert Blades and immediately assigned to Du Pont. The patent describes a method that produces a high strength synthetic polyamide n6 fiber which Du Pont has marketed under the trade name Kevlar. This fiber has an extraordinary as-spun strength, five times stronger pound for pound than steel, as well as a modulus (stretch resistance) equal to glass, eight times as high as industrial grade polyester, and twenty-five times as high as industrial nylon. Kevlar is also much more heat resistant than industrial-grade nylon or polyester. These extraordinary physical properties, as well as Kevlar's light weight and rustproof character, have enabled Du Pont to market it for use in a variety of applications including, but not limited to, roping, spacecraft and airplane parts, bullet resistant clothing and armor, tires, and boat hulls. Depending upon its use, Kevlar has been used as a substitute for steel, aluminum, asbestos, nylon, rayon, polyester, cotton, or cotton fiber. Kevlar is available as either a continuous [**9] rope or filament, or alternatively as a staple or pulp. Staple consists of short filaments which can be spun into yarn. Pulp is ground fiber most often used as an asbestos substitute.

n5 Our recitation of the facts follows the ALJ's and the Commission's findings which are supported by at least substantial evidence. See *Surface Technology, Inc. v. U.S. International Trade Commission*, 801 F.2d 1336, 1340, 231 U.S.P.Q. (BNA) 192, 195 (Fed. Cir. 1986).

n6 Polyamides are polymers containing amide linkages. Aromatic polymers are polyamides where the radicals linking the amide linkages constitute aromatic radicals. The polymer described in claim 13 of the Blades '756 patent is a wholly aromatic para-positioned polyamide.

The procedure by which the synthetic fiber is manufactured involves dry spinning polyamides from coagulation solutions called dopes. In dry spinning, a

specialized filter called a spinneret is placed a short distance from a bath of spinning dope that is extruded through a [**10] layer of gas and into an aqueous coagulation bath. n7 The dope used in the Blades '756 patent consists of para-positioned aromatic polyamides dissolved in highly concentrated sulfuric acid and heated to around 100 degrees C. The polyamide used is a high molecular weight poly (p-phenylene terephthalamide) (PPD-T).

n7 Dry spinning can be contrasted with wet spinning where the spinneret is placed directly into the spinning dope. Wet spinning is the process used to make a number of synthetic fibers including rayon and nylon.

[SEE ILLUSTRATION IN ORIGINAL]

The high molecular weight of the polyamide results in a high inherent viscosity n8 of approximately 4.4% when 20% PPD-T by weight is dissolved in approximately 100% sulfuric acid.

n8 See Footnote in Original

In 1969 Dr. Blades, one of Du Pont's research scientists, began to develop [**11] and [*1478] conduct experiments aimed at producing a high-strength synthetic fiber. Blades exclusively employed a wet-spinning method in his early work, using PPD-T as well as other polymers. This early work had minimal success. Although the dry-spinning method was known by Du Pont scientists, a 1966 report indicated that the low solubility of PPD-T precluded use of the dry-spinning technique. In 1969, Du Pont's Dr. Peter Boettcher suggested to Blades that dry spinning might improve the end-results by influencing coagulation. Dr. Boettcher had learned about dry spinning from a Monsanto Morgan patent (Morgan '645 patent).

Blades' early experimentation with the dry-spinning process did not yield fiber with an increased tenacity despite the fact that dry spinning was known to improve fiber tenacity using other dopes. Blades' initial conclusion was that dry spinning would be unsuccessful with PPD-T. Nevertheless, he continued experimenting with the dry-spinning process, and, at his supervisor's suggestion, began using sulfuric acid as a solvent. Blades also redesigned and built a mixing device because of some difficulties he encountered mixing PPD-T with the sulfuric acid. Sulfuric [**12] acid was not an evident candidate as a solvent because it was known to react with the polymer and become degraded at high temperatures. Blades discovered, however, that he could produce an

improved fiber using 10.2% polyamide in about 100% sulfuric acid. Under this system he found that there was no difference in tensile strength of the fiber using a wet-spun or dry-spun method. PPD-T was a somewhat unusual choice of polymer for this work because of its characteristic rigidity caused by the placement of para-oriented aromatic rings in the chain. The para-positioning of the aromatic rings makes the polyamide much less soluble than analogous meta-positioned rings. But the fact is that, while meta-positioned polymers generally form only isotropic solutions, para-positioned polymers of Blades' invention form anisotropic solutions n9 at high concentrations.

n9 An anisotropic solution exhibits optical birefringence (i.e., the liquid crystalline solution refracts light in two directions). This characteristic imparts a high degree of orientation to the spun fibers yielding a stiffer and stronger end product without requiring post-coagulation drawing as is required in other man-made fibers such as nylon and rayon.

[**13]

In subsequent trials, Blades increased the concentration of PPD-T and obtained a significantly improved fiber, especially using the dry-spinning method. When the system was operated at room temperature, however, he found that undissolved polyamide clogged up the holes of the spinneret. He therefore heated the dope at these higher concentrations to dissolve all the polyamide and keep the system above the melting point. To his surprise, Blades discovered that there was little or no degradation of the polyamide at high temperatures. He explained this unexpected absence of degradation by theorizing that, when the system contains high concentrations of PPD-T, the sulfuric acid binds to the polymer and chemically deactivates it.

After numerous trials, Blades found that an optimal fiber could be produced using PPD-T of 4.4 inherent viscosity at a 20% concentration in approximately 100% sulfuric acid. The dope was then heated to 95 degrees C and dry spinning was then carried out at about 100 degrees C. The resultant fiber had a tenacity of approximately two times that of previous experimental fibers.

In April 1971, Blades filed an application with the PTO claiming the method of making [**14] these aramid fibers. The initial application and two subsequent applications were rejected in large part on the basis of anticipation by the Morgan '645 and the Kwolek '542 patents which Du Pont had brought to the attention of the examiner. Initially the examiner also rejected the

application under 35 U.S.C. § 103. Blades, however, was able to overcome the examiner's objections, and on May 2, 1973, the PTO gave notice of allowance of the Blades '756 patent. Blades assigned the patent rights to Du Pont.

B. *Validity*. Claim 13, the narrowest claim, is the only claim involved on this [*1479] appeal. n10 Akzo says that that claim is invalid under 35 U.S.C. §§ 102 and 103. More specifically, Akzo argues that the Commission misconstrued the legal standard of anticipation and therefore erroneously held that the Blades '756 patent was not anticipated. In addition, appellants argue that the Commission failed properly to evaluate the prior art in determining obviousness *vel non*. Of course, it goes without elaboration that the Blades '756 patent enjoys a presumption of validity under 35 U.S.C. § 282.

n10 Claim 13 reads as follows:

A method comprising extruding a spinning dope from an orifice through a layer of gas and into an aqueous bath at a temperature of under 50 degrees C said dope comprising a polyamide and a solvent of sulfuric acid of at least 98% concentration at a concentration of at least 40 grams of said polyamide per 100 ml. of solvent, said polyamide having an inherent viscosity of at least 3.0 and being poly(p-phenylene terephthalamide).

[**15]

As we have said, Akzo challenges the Commission's use of § 102, claiming that that tribunal misinterpreted the legal standard of anticipation. Under 35 U.S.C. § 102, anticipation requires that each and every element of the claimed invention be disclosed in a prior art reference. *W. L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1554, 220 U.S.P.Q. (BNA) 303, 313 (Fed. Cir. 1983), cert. denied, 469 U.S. 851, 83 L. Ed. 2d 107, 105 S. Ct. 172 (1984). In addition, the prior art reference must be enabling, thus placing the allegedly disclosed matter in the possession of the public. *In re Brown*, 51 C.C.P.A. 1254, 329 F.2d 1006, 1011, 141 U.S.P.Q. (BNA) 245, 249 (CCPA 1964). Akzo asserts, however, that the Commission wrongly used an "*ipsissimis verbis* test" in reaching its conclusion that the Blades '756 patent was not anticipated by the Morgan '645 disclosure. n11 We do not read the Commission's

opinion as requiring such an "*ipsissimis verbis* test." Rather, we understand that opinion as simply [*16] finding that the prior art reference did not disclose, to one of ordinary skill in the art, n12 the process for making the aramid fibers described in claim 13. The Commission noted that while the Morgan '645 patent called for the use of sulfuric acid, it did not call for the use of at least 98% concentrated sulfuric acid which was critical for the success of the Blades process. The Commission also concurred with the ALJ and found that concentrated sulfuric acid is not inherently 98% sulfuric acid to one skilled in the art.

n11 An "*ipsissimis verbis*" test requires the same terminology in the prior art in order to find anticipation.

n12 The Commission made specific findings on the skill of the art. It concluded that the skill in the art was high -- that of a doctorate or post-doctorate in chemistry.

Because we determine that the Commission did not use an incorrect legal standard under § 102, we are bound to [*17] accept its and the ALJ's factual findings if supported by substantial evidence. 5 U.S.C. § 706 (1982). As appellants themselves point out, anticipation under § 102 is a factual determination. *Lindemann Maschinenfabrik GMBH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 1458, 221 U.S.P.Q. (BNA) 481, 485 (Fed. Cir. 1984). We must conclude that there is substantial evidence in the record supporting the Commission's conclusion that claim 13 of the Blades '756 patent was not anticipated by the prior art. As the Supreme Court noted in *Universal Camera v. NLRB*, 340 U.S. 474, 488, 95 L. Ed. 456, 71 S. Ct. 456 (1951), the substantial evidence standard does not allow a court to conduct a *de novo* investigation of the evidence on the record before it and reach an independent conclusion; rather, the court's review is limited to deciding whether there is sufficient evidence in the record considered as a whole to support the agency's findings. The mere fact that a reasonable person might reach some other conclusion is insufficient for this court to overturn the agency's conclusion. See *SSIH Equipment S. A. v. U.S. International Trade Commission*, 718 F.2d 365, 381, 218 U.S.P.Q. (BNA) 678, 691 (Fed. Cir. 1983) [*18] (additional views of Judge Nies).

[*1480] The ALJ concluded, after extensive analysis, that the claimed invention of the Blades '756 patent was not anticipated by prior art, including the Morgan '645 patent. He noted that, while the Morgan '645 patent teaches the use of an airgap, the use of an airgap in and of itself does not guarantee an improved

fiber. This was obvious from Blades' early work. The ALJ also found that sulfuric acid in any concentration was not disclosed as a solvent in the Morgan '645 patent; nor did that patent disclose PPD-T in its optically anisotropic state. Moreover, the ALJ found that the Morgan '645 patent was not an enabling disclosure with regard to the claimed spinning dope. Neither the 18% concentration of PPD-T nor the heating of the dope to achieve this concentration was disclosed in the Morgan '645 patent. The ALJ also rejected appellants' arguments that the Blades process was anticipated by the Hill and Smith patents which were referenced in the Morgan '645 patent. This would have required Blades randomly to pick and choose among a number of different polyamides, a plurality of solvents, and a range of inherent viscosities. The ALJ rejected [**19] such "random picking and choosing" of prior art, relying on *In re Arkley*, 59 C.C.P.A. 804, 455 F.2d 586, 587, 172 U.S.P.Q. (BNA) 524, 526 (CCPA 1972), and concluded in effect that the anticipatory reference must disclose in the prior art a thing substantially identical with the claimed invention. In a somewhat more limited consideration -- restricted to the concentration of sulfuric acid in the Blades patent -- the Commission itself reached the same result.

Accordingly, we hold that there is substantial evidence in the record as a whole to sustain the Commission's (including the ALJ's) findings that the Blades process was not anticipated by any prior art. n13

n13 Appellants cite this court's opinion in *Titanium Metals Corp. v. Banner*, 778 F.2d 775, 782, 227 U.S.P.Q. (BNA) 773, (Fed. Cir. 1985), as supporting their contention that the Blades '756 patent was anticipated by the prior art. *Titanium Metals* is easily distinguishable from this case. There, a single reference disclosed a range of alloys including that claimed by appellant. In this case, the Commission found that neither the Morgan '645 patent nor any other prior art reference disclosed the Blades '756 process.

[**20]

Appellants say, as an alternative to their § 102 argument, that the trial tribunal erred when it failed to find that the Blades '756 patent would have been obvious under 35 U.S.C. § 103 in view of the Morgan '645 and Kwolek '542 patents. It is now established that obviousness is a question of law based on factual inquiries which include:

- (1) the scope and content of the prior art;
- (2) the difference between prior art and the claims at stake;
- (3) the level of ordinary skill in the art; and
- (4) objective evidence of nonobviousness (secondary factors).

Such objective indications as commercial success and long-felt but unresolved needs, failure of others, copying, and unexpected results are relevant facts relating to the issue of validity. See, e.g., *In re DeBlauwe*, 736 F.2d 699, 222 U.S.P.Q. (BNA) 191 (Fed. Cir. 1984) (obviousness a question of law to be determined on the facts). Since obviousness is a question of law, we are not bound by the Commission's ultimate determination on the matter of § 103 obviousness. See [**21] *Corning Glass Works v. U.S. International Trade Commission*, 799 F.2d 1559, 1565 & n.5, 230 U.S.P.Q. (BNA) 822, 826 & n.5 (Fed. Cir. 1986).

In the proceedings before the Commission, Du Pont premised its defense of nonobviousness on the basis that the prior art -- mainly that the Morgan '645 patent and the Kwolek '542 patent -- actually led away rather than toward the Blades process. The Commission found Du Pont's expert witness' testimony to be compelling. That witness, Dr. Uhlmann, explained why the Morgan '645 patent, when considered with other prior art references, including the Kwolek '542, Bair '941, and Cipriani '793 patents, would not have rendered the invention of Blades '756 patent obvious. The Kwolek '542 patent calls for conventional wet or dry spinning and calls for [*1481] concentrations of PPD-T far lower than required by the Blades process. The Bair '941 patent does not disclose heating sulfuric acid with PPD-T to achieve an anisotropic solution. While the Morgan '745 patent discloses air-gap spinning, its emphasis is on meta-oriented polymers. Based on these differences, Dr. Uhlmann concluded that one skilled in the art would *not* combine them [**22] or be led to the Blades invention.

As the ALJ recognized, prior art references before the tribunal must be read as a whole and consideration must be given where the references diverge and teach away from the claimed invention. *W. L. Gore & Associates, Inc. v. Garlock*, 721 F.2d 1540, 1550, 220 U.S.P.Q. (BNA) 303, 311 (Fed. Cir. 1983), cert. denied, 469 U.S. 851, 83 L. Ed. 2d 107, 105 S. Ct. 172 (1984). Moreover, appellants cannot pick and choose among individual parts of assorted prior art references "as a mosaic to recreate a facsimile of the claimed invention." 721 F.2d at 1552, 220 U.S.P.Q. (BNA) at 312. In this case, the ALJ found that Akzo's expert witnesses could

not show how the prior art patents could be brought together to render the Blades '756 invention obvious without reconstructing the teachings of those patents assisted by hindsight.

The secondary considerations also compelled the Commission to make a finding of non-obviousness. The commercial success of Du Pont's Kevlar patent has been enormous and its range of uses substantial. [**23] Du Pont is still developing commercial applications for Kevlar, having spent significant amounts of money in developing both new uses and new markets for the product. Commercial success is, of course, a strong factor favoring non-obviousness. *Simmons Fastener Corp. v. Illinois Tool Works, Inc.*, 739 F.2d 1573, 1575-76, 222 USPQ 744, 777, (Fed. Cir. 1984), cert. denied, 471 U.S. 1065, 85 L. Ed. 2d 496, 105 S. Ct. 2138 (1985). Moreover, as the ALJ noted, Blades solved a problem that Du Pont research scientists had been tackling for years. The Blades process represents a solution to a long-felt need and practitioners in the field immediately recognized that that process was a remarkable advancement in polymer spinning technology. Indeed, as brought out in this appeal, even one of Akzo's scientific reports repeatedly expressed concern for degradation of PPD-T and amazement at the disclosure of the Blades '756 process.

We agree, therefore, with the Commission's determination that the Blades '756 patent is not invalid for anticipation or obviousness.

C. *Alleged inequitable conduct before the Patent and Trademark Office (PTO)*. Appellants urge [**24] that Du Pont misled the patent examiner in two respects: first, that Du Pont submitted an affidavit to overcome the examiner's obviousness objections that failed to compare the Blades process with the closest prior art; and, second, that Du Pont persistently argued that the Morgan '645 patent and the Kwolek '542 patent did not anticipate the Blades patent.

In *J. P. Stevens & Co. v. Lex Tex Ltd.*, 747 F.2d 1553, 223 U.S.P.Q. (BNA) 1089 (Fed. Cir. 1984), cert. denied, 474 U.S. 822, 106 S. Ct. 73, 88 L. Ed. 2d 60 (1985), this court articulated a two-prong test for establishing inequitable conduct before the PTO. To render a patent unenforceable, the proponent of the inequitable conduct must first establish by clear and convincing evidence that there was a material misrepresentation or omission of information, and then establish a threshold level of intent on the part of the applicant. See also *Atlas Powder Co. v. E. I. du Pont de Nemours & Co.*, 750 F.2d 1569, 1577-78, 224 U.S.P.Q. (BNA) 409, 414-15 (Fed. Cir. 1984).

Our major standard [**25] for materiality is whether a reasonable examiner would consider the

omission or misrepresentation important in deciding whether to issue the patent. n14 Materiality and intent must also be considered together: the more material the omission or misrepresentation, the less intent that must be shown to reach [*1482] a conclusion of inequitable conduct. *American Hoist & Derrick Co. v. Sowa & Sons*, 725 F.2d 1350, 1363, 220 U.S.P.Q. (BNA) 763, 773 (Fed. Cir.), cert. denied, 469 U.S. 821, 224 U.S.P.Q. (BNA) 520, 83 L. Ed. 2d 41, 105 S. Ct. 95 (1984).

n14 This standard is identical to the PTO standard of materiality. 37 C.F.R. § 1.56(a).

We uphold the Commission's findings and conclusion that Du Pont's affidavit or arguments before the examiner did not constitute material misrepresentations. As Akzo concedes, the examiner had both the Morgan '645 patent and the Kwolek '542 patents before him throughout the examination process. It was on the basis of these two patents that [**26] Du Pont's first three applications were rejected. The mere fact that Du Pont attempted to distinguish the Blades process from the prior art does not constitute a material omission or misrepresentation. The examiner was free to reach his own conclusion regarding the Blades process based on the art in front of him. Nor does Du Pont's affidavit, advocating a particular interpretation of the Morgan '645 and Kwolek '542 patents (albeit favorable to Du Pont's position), show any intent to mislead the PTO. Du Pont's intent was not to mislead, but rather to distinguish prior art from the Blades process and demonstrate to the examiner that the Blades process would not have been obvious in light of Morgan '645 and Kwolek '542. The sum of it is that, because we cannot see either a proved material misrepresentation or a proved intent to mislead, we must conclude that Akzo has not met its burden of proving inequitable conduct before the PTO.

III. Due Process and Treaty Rights

A. *Due Process*. This aspect of the appeal concerns the Commission's procedures with respect to the private parties' confidential information. On May 21, 1984, the ALJ issued an administrative protective order [**27] pertaining to confidential business information, as defined in the Commission's Rules, 19 C.F.R. § 210.30(d)(7) (1976), that would be produced during the discovery phase of the investigation.

In general, this order permitted access to all such confidential information by Akzo's and Du Pont's outside counsel but not by management personnel or in-house counsel of either private company. At a preliminary conference held June 22, 1984, Akzo made the first of three unsuccessful attempts to modify the protective

order. Arguing that there was a substantial overlap between the Commission's investigation and an action brought by Akzo against Du Pont then (and still) pending in the United States District Court for the District of Delaware, Akzo moved to align the protective orders by modifying the ALJ's protective order so that its terms coincided with those of a protective order earlier issued by the District Court in the Delaware action. The ALJ denied Akzo's motion on July 6, 1984.

By letter dated June 27, 1984, Akzo requested that the protective order be amended to include three designated members of Akzo's in-house counsel. On July 6, 1984, the ALJ concluded that Akzo failed to demonstrate [**28] the requisite need to warrant granting Akzo's in-house counsel access to Du Pont's confidential business information. Akzo renewed its motion to modify the protective order on February 8, 1985, this time urging that both Akzo's in-house counsel and the general manager of Akzo's Industrial Fiber Group should be granted limited access to Du Pont's confidential business information. Because Akzo failed (in the ALJ's view) to demonstrate a need for either its in-house counsel or its general manager to have access to the requested confidential material, the ALJ denied Akzo's motion on February 21, 1985.

Akzo now contends that the protective order, issued by the ALJ on May 21, 1984, effectively deprived it of its rights to confrontation, to rebuttal, and to effective assistance of counsel. According to Akzo, under the terms of the protective order, the parties' designation of materials as confidential had the effect of "unilaterally immunizing them from scrutiny by the opposing party." Moreover, Akzo maintains that the system established by the protective order completely denied Akzo "access to all [*1483] of the critical evidence on which the decision against it was based."

Our [**29] examination of the challenged protective order, as it was enforced, shows Akzo's charges to be groundless. The protective order provides, *inter alia*, that confidential business information "shall be disclosed at any hearing only *in camera* before the Commission or the administrative law judge." Although the protective order enabled either party to designate business information as confidential, such a designation did not "unilaterally immunize" purportedly confidential documents from scrutiny by the opposing party. In the first place, all the protected information was freely available to outside counsel who could fully consider it, although they were not free to show or repeat it to Akzo's management or in-house counsel. Second, paragraph 10 of the protective order provided a mechanism by which either party was free to object to its adversary's designations at any stage of the proceeding. According to paragraph 10, if either party disagreed with respect to the

designation of business material as confidential, that party "shall confer [with the supplier] as to the status of the subject information proffered within the context of this order." In the event that the parties failed [**30] within 10 days to reach agreement as to the proper status of the information, the protective order provided that either party could submit the issue to the ALJ or the Commission for resolution. The mechanism of paragraph 10 could also be used to permit disclosure to particular persons of otherwise classified material. Although, as mentioned earlier, Akzo attempted to modify the protective order on three separate occasions, Akzo never invoked the dispute resolution procedures of paragraph 10 to challenge Du Pont's characterization of business information as confidential or as not disclosable to particular individuals. Third, the protective order expressly permitted other exceptions to be made by the ALJ or the Commission.

In denying Akzo's various motions to amend the protective order, the ALJ relied on the Commission's decision in *Certain Rotary Wheel Printers*, Inv. No. 337-TA-145, 5 ITRD 1933 (Nov. 4, 1983). According to *Rotary Wheel Printers*:

protection of confidential information is crucial to the Commission's ability to carry out its statutory responsibilities. In addition, [**31] review after discovery and the evidentiary hearing are completed would provide an inadequate remedy. The inappropriate release of confidential information can never be fully remedied. The Commission has traditionally been reluctant to release confidential information where not absolutely necessary.

5 ITRD at 1935.

Thus, implicit in Akzo's due process attack on the protective order is the position that, in the interests of fundamental fairness, it was "absolutely necessary" for Akzo's in-house counsel and general manager to have access to Du Pont's confidential business information. However, "in section 337 investigations, it is the exception rather than the rule to release confidential information to in-house counsel." *Id.*

The primary justification for the Commission's reluctance to grant adversary management and in-house counsel access to confidential business information is that, in order to discharge its statutory responsibilities

within the strict statutory time limits, the Commission is heavily dependent on the voluntary submission of information. Disclosure of sensitive materials to an adversary would undoubtedly have a chilling effect on the parties' willingness [**32] to provide the confidential information essential to the Commission's fact-finding processes. The Commission has resolved the difficult and controversial question of the role of in-house counsel by taking a conservative position on the side of optimum shielding of business information. Obviously, where confidential material is disclosed to an employee of a competitor, the risk of the competitor's obtaining an unfair business advantage may be substantially increased. This general Commission position is neither unreasonable nor arbitrary. It represents [*1484] an appropriate balancing between the needs demanded by the Commission's process and the parties' need for participation by its in-house personnel.

This is especially true because there is no *per se* rule against disclosure to either a competitor's in-house counsel or management representative. *Rotary Wheel Printers* established, and the ALJ employed, a three-part balancing test to determine whether, to whom, and under what conditions to release confidential information. Factors to be considered include the party's need for [**33] the confidential information sought in order to adequately prepare its case, the harm that disclosure would cause the party submitting the information, and the forum's interest in maintaining the confidentiality of the information sought. 5 *ITRD at 1937*.

After reviewing the record, the ALJ concluded that Akzo failed to demonstrate clearly a need for granting access to confidential business information to either Akzo's in-house counsel or key management officials. The ALJ also found that disclosure would cause substantial harm to Du Pont's competitive position. These particular rulings cannot be faulted. The court understands that all information relating to patent validity and enforceability (*see* Part II, *supra*) was promptly made fully available to all. As for the information bearing on the important question of whether Akzo's importation of aramid fibers would tend to destroy or substantially injure Du Pont's business (*see* Part IV, *infra*), it is obvious that that confidential information -- relating to Du Pont's business, activities, plans and expectations -- should not be made available (unless, perhaps, where absolutely necessary for a fair hearing) to a direct [**34] competitor like Akzo. That such full access was not absolutely necessary to appellants' making of their own case is shown by the crucial fact that Akzo was at all times perfectly free to offer its own market projections as well as to reveal its own activities, forecasts, and interpretations. Both sides

could present to the Commission their own information on those matters without knowing those of the other side's.

Akzo argues, however, that the denial of its motions to modify the protective order effectively denied its due process right to participate in its own defense. The contention is that Akzo was subjected to serious adverse governmental action on the basis of evidence which Akzo was never permitted to know and "personally" refute. In support of this position, Akzo invokes § 555(b) of the Administrative Procedure Act which was made applicable to § 337 proceedings by the 1974 Amendments to the Tariff Act of 1930. Under § 555(b), "[a] party is entitled to appear in person or by or with counsel or other duly qualified representative in an agency proceeding." 5 *U.S.C. § 555* [**35] (b). However, Akzo was represented by competent and experienced outside counsel throughout the proceedings; these counsel were aware of all confidential information. Further, Akzo fails to recognize that "the affirmative grant of the right to appear apparently bestowed by Section 555(b) is not blindly absolute, without regard to the status or nature of the proceedings and concern for the orderly conduct of public business." *deVyver v. Warden, U.S. Penitentiary*, 388 *F. Supp.* 1213, 1222 (*M.D. Pa.* 1974) citing *Easton Utilities Commission v. Atomic Energy Commission*, 137 *U.S. App. D.C.* 359, 424 *F.2d* 847, 852 (*D.C. Cir.* 1970). Whatever else § 555(b) guarantees to parties to an administrative proceeding under § 337, it does not mandate disclosure of significant confidential information to in-house counsel and corporate executives of a business competitor -- where that information is fully available to outside counsel. Akzo's contention withers in the face of unrefuted evidence that more than 90 people representing Akzo, including numerous expert witnesses and [**36] members of the battery of four law firms comprising Akzo's defense team, had unrestricted access to Du Pont's confidential information.

Akzo has also failed to demonstrate that it suffered actual harm under the confidentiality procedures instituted by the ALJ. Although Akzo's insiders were denied access [*1485] to Du Pont's economic and market forecasts with respect to the production and sale of aramid fibers, Akzo was not prevented (as we have pointed out) from offering its own projections into evidence under the cover of confidentiality. It is difficult to see how Akzo was prejudiced.

Finally, we have neither found nor been directed to any judicial decision in this country mandating, in the circumstances present here, that business confidential information *must* be made available to inside management. On the contrary, we are aware, from the practice of our own court, that records in appeals to us

are frequently classified in large part, and are presumably not available to the management of the opposing party. Moreover, there are a substantial number of decisions upholding confidentiality comparable to that accepted by the Commission. Akzo tells us that most of these involved [**37] only pretrial discovery (and not evidence at a hearing or trial) and that the others are also distinguishable. We do not stop to examine these arguments because, at the least, these decisions (a) show that there is no holding to the contrary of the one we now make and (b) strongly suggest the validity of carefully tailored protective orders allowing exceptions to be made if adequate proof is made. n15

n15 This case differs from *Viscofan S.A. v. U.S. International Trade Commission*, 787 F.2d 544, 552, 229 U.S.P.Q. (BNA) 118, 124 (Fed. Cir. 1986), because here (but not in *Viscofan*) the confidentiality problem was directly related to the propriety of the exclusion order. Accordingly, we have reviewed the merits of the confidentiality actions. See *American Telephone and Telegraph Co. v. U.S. International Trade Commission*, 67 C.C.P.A. 165, 626 F.2d 841, 842, 206 U.S.P.Q. (BNA) 111, 112 (CCPA 1980).

B. *Treaty rights.* As an alternate ground for reversal, Akzo argues that, [**38] because the proceedings below discriminated against Akzo on the basis of its Dutch nationality, they violate United States treaty obligations. We disagree with Akzo's premise that there was discrimination here. Essentially, Akzo employs a *non sequitur* to support its position. The core of Akzo's claim is that it was denied the rights that would have been afforded a domestic firm sued for patent infringement in a district court. According to Akzo, this "inferior treatment" by the Commission constitutes discrimination on the basis of nationality. That analysis misses the mark. The appropriate inquiry is whether Akzo was afforded the same rights afforded to domestic firms in a § 337 proceeding before the Commission. Clearly, Akzo has failed to demonstrate that it suffered from discriminatory treatment. First, under the express terms of the protective order, both Akzo and Du Pont were bound by identical procedures regarding confidentiality and discovery. Neither party was allowed access to the other party's confidential business information. Second, the same argument was rejected in *Certain Spring Assemblies and Components Thereof*, Inv. No. 337- TA-88, 216 U.S.P.Q. (BNA) 225, [**39] *aff'd sub nom. General Motors Corp. v. U.S. International Trade Commission*, 69 C.C.P.A. 116, 687 F.2d 476, 215 U.S.P.Q. (BNA) 484 (CCPA 1982), *cert. denied*, 459 U.S. 1105, 74 L. Ed. 2d 953, 103 S. Ct. 729

(1983). In that case, respondent unsuccessfully raised certain U.S.- Canadian treaties as a defense to enforcement of § 337. The Commission observed:

Section 337 does not discriminate against foreign corporations by virtue of their foreign status. It applies to foreign and domestic corporations alike. Section 337 gives the Commission jurisdiction over products imported from a foreign country, *even if they are manufactured and/or imported by a U.S. corporation.* The Commission's jurisdiction lies in unfair acts occurring in connection with the importation of goods into the United States or their sale, and it extends to all persons engaged in such unfair acts.

216 U.S.P.Q. (BNA) at 231 (emphasis added).

IV. Other Issues

In this part we consider four separate issues raised by appellants: (1) whether the Commission [**40] properly found that continued importation of Akzo's product would substantially injure or tend to injure Du Pont; [**1486] (2) whether adjudication of § 337 actions by a non-Article III tribunal is unlawful; (3) whether Du Pont's pricing practices (with respect to its aramid products) violate the antitrust laws; and (4) whether Du Pont committed inequitable conduct by infringing Akzo's own patent.

A. *Tendency to destroy or substantially injure.* The ALJ concluded (and we have upheld) that Akzo violated § 337(a) by the unlawful importation or sale of certain aramid fibers produced in the Netherlands by means of a process which if practiced in the United States would infringe the Blades '756 patent. Such acts, long considered to be violative of § 337, clearly constitute unfair acts for the purposes of the statute. See, e.g., *In re Chain Door Locks*, USITC Pub. No. 770 (Apr. 1976), 191 U.S.P.Q. (BNA) 272 (USITC 1976); *In re Von Clemm*, 43 C.C.P.A. 56, 229 F.2d 441, 108 U.S.P.Q. (BNA) 371 (CCPA 1955); *In re Amtorg Trading Corp.*, 22 C.C.P.A. 558, 75 F.2d 826, 24 U.S.P.Q. (BNA) 315 [**41] (CCPA), *cert. denied*, 296 U.S. 576, 56 S. Ct. 102, 80 L. Ed. 407 (1935).

However, unfair acts, without more, are legally insufficient to support a finding of a § 337 violation. That provision declares unlawful "unfair methods of competition and unfair acts in the importation of articles, the effect or tendency of which is to destroy or substantially injure an industry, efficiently and

economically operated, in the United States." Thus, to prove a violation of § 337, the complainant must show both an unfair act and a resulting detrimental effect or tendency. *New England Butt Co. v. U.S. International Trade Commission*, 756 F.2d 874, 876, 225 U.S.P.Q. (BNA) 260, 261 (Fed. Cir. 1985). As this court recently held in *Textron, Inc. v. U.S. International Trade Commission*, 753 F.2d 1019, 224 U.S.P.Q. (BNA) 625 (Fed. Cir. 1985), "section 337 has consistently been interpreted to contain a distinct injury requirement of independent proof." 753 F.2d at 1028, 224 U.S.P.Q. (BNA) at 631 (citations omitted); accord *Corning Glass Works v. U.S. International Trade Commission*, 799 F.2d 1559, 230 U.S.P.Q. (BNA) 822 (Fed. Cir. 1986); [**42] *Warner Brothers, Inc. v. U.S. International Trade Commission*, 787 F.2d 562, 564, 229 U.S.P.Q. (BNA) 126, 127 (Fed. Cir. 1986).

According to *Textron*, "Congress may well have included this separate requirement . . . to insure that the extreme and internationally provocative remedy contemplated [by § 337] -- exclusion of imports from particular countries -- would be implemented only when this is compelled by strong economic reasons." 753 F.2d at 1028-29, 224 U.S.P.Q. (BNA) at 631 (citations omitted). It follows that the mere concurrence of an unfair act and some resulting injury is not necessarily sufficient, in itself, to establish a violation of § 337. "Congress has directed that the remedy of section 337, involving as it does the act of the sovereign in closing our borders to certain imports, be exercised only in those instances where at least there is proof of a tendency to substantially injure the subject industry." *Corning Glass Works v. U.S. International Trade Commission*, 799 F.2d 1559, 1567, 230 U.S.P.Q. (BNA) 822, 827 (Fed. Cir. 1986) [**43] (emphasis in original).

Not only is an injury determination intimately wed to the particular facts of each case, but also the determination of injury is precisely the type of question which Congress has committed to the expertise of the Commission. Thus, on appeal, our review of an injury determination is limited to deciding whether the Commission's decision is supported by substantial evidence. 19 U.S.C. § 1337(c) (1982); 5 U.S.C. § 706 (1982); *SSIH Equipment S.A. v. U.S. International Trade Commission*, 718 F.2d 365, 371, 218 U.S.P.Q. (BNA) 678, 684 (Fed. Cir. 1983); *General Motors Corp. v. U.S. International Trade Commission*, 69 C.C.P.A. 116, 687 F.2d 476, 215 U.S.P.Q. (BNA) 484 (CCPA 1982), cert. denied, 459 U.S. 1105, 74 L. Ed. 2d 953, 103 S. Ct. 729 (1983). In other words, we must decide "whether substantial evidence supports the facts relied on and whether the Commissioner's [sic] determination, on the record, is arbitrary, capricious, or an abuse of discretion." *Corning Glass Works*, 799 F.2d at 1568, 230 U.S.P.Q.

(BNA) at 828. [**44] As we noted in *Corning Glass Works*, "the question of quantum of injury is not one on [**1487] which it would be appropriate for this court to put forth a legal standard." *Id.* Nor are we allowed to substitute our own judgment for that of the Commission. *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416, 28 L. Ed. 2d 136, 91 S. Ct. 814 (1971). Of course, a decision is supported by substantial evidence if it is supported by "such relevant evidence as a reasonable mind might accept as adequate to support a conclusion." *Consolidated Edison Co. v. NLRB*, 305 U.S. 197, 229, 83 L. Ed. 126, 59 S. Ct. 206 (1938).

Our review of the record in this case compels the conclusion that the Commission's determination -- that Akzo's unfair imports of aramid fibers will have a tendency to injure Du Pont substantially -- is supported by substantial evidence. The Commission based its injury determination on a prediction of the future effect of Akzo's unfair imports on the domestic industry. There is substantial support for this determination. The record reflects Akzo's intent and capacity to enter the United States aramid fibers market, Du Pont's [**45] resulting loss of revenue, and a probable price reduction by Du Pont in response to Akzo's entry into the United States market. Nonetheless, Akzo urges this court to overturn the Commission's exclusion order and deny relief to Du Pont. Akzo first contends that its projected share of the U.S. market during the remaining life of the '756 patent is *de minimis*. It would be both unwise and improper for this court to establish some arbitrary market-share benchmark as a prerequisite to a finding of a § 337 violation and we decline to do so. It is sufficient that the record supports the Commission's conclusion that, upon entry into the U.S. market, Akzo will capture a significant share of the domestic market, if not in relative percentage figures than certainly in absolute dollar figures.

Second, Akzo maintains that, notwithstanding its entry into the market, Du Pont's aramid fibers sales volume, revenues and profits will all increase during the remaining life of the patent. But Akzo mischaracterizes the proper standard for measuring injury. The issue is not whether Du Pont's sales, revenues and profits will increase beyond their 1985 levels but rather whether Akzo's presence in the [**46] market will substantially injure Du Pont's business during the 1986 - 1990 period (the remaining life of the Blades '756 patent).

As Du Pont correctly points out, nothing in § 337 requires a showing that the domestic industry will be utterly deprived of profitability. "Where the unfair practice is the importation of products that infringe a domestic industry's . . . patent right, even a relatively small loss of sales may establish, under section 337(a), the requisite injury . . ." *Bally/Midway Mfg. Co. v. U.S.*

International Trade Commission, 714 F.2d 1117, 1124, 219 U.S.P.Q. (BNA) 97, 102 (Fed. Cir. 1983). This proposition is entirely consistent with the legislative history of § 337. In a House Report discussing the application of § 337 to unfair competition involving patent infringement, Congress stated: "Where unfair methods and acts have resulted in *conceivable losses of sales*, a tendency to substantially injure such industry has been established." See House Comm. on Ways and Means, Trade Reform Act of 1973, H.R. Rep. No. 571, 93d Cong. 1st Sess. 78 (1973) [**47] (emphasis added); accord *In re Von Clemm*, 43 C.C.P.A. 56, 229 F.2d 441, 445, 108 U.S.P.Q. (BNA) 371, 374 (CCPA 1955).

Because substantial evidence supports the facts relied upon by the Commission in making its determination that Akzo's unfair imports would tend to injure Du Pont substantially, we must affirm its injury determination. Akzo has failed to demonstrate that the Commission's determination is arbitrary, capricious, or an abuse of discretion.

A contrary result would emasculate the protections of § 337 with respect to high technology ventures. Typically, in high technology industries, acute competition forces competitors to commit substantial resources to research and development in hopes of generating profits before either their patents expire or before technological advance makes the products obsolete. [*1488] Thus, innovators frequently resign themselves to losses during the early life of their patents with the expectation that, if product development and marketing efforts are successful, profits earned during the later life of their patents will provide sufficient compensation for their endeavors.

On this record, Du Pont's aramid fibers industry [**48] can be said to furnish a classic illustration. Although Du Pont has undertaken extensive product development and marketing efforts since 1973, the company had not earned any return on its investment through 1984. Du Pont anticipates that it will realize its first positive net operating earnings from its aramid fibers production in 1985.

In reaching its injury determination, the Commission permissibly recognized that the aramid fibers industry is in transition from a period requiring extremely high investment of resources to a period when the industry will finally realize a return on that investment. In these circumstances, diminished profits, lower return on investment, and reduced sales are all indicative of substantial injury.

B. *Adjudication of § 337 actions by a non-Article III tribunal.* Apparently employing the "kitchen sink" or "let's try anything" approach to appellate advocacy, Akzo raises an additional challenge to the Commission's

proceedings. Relying primarily on *Northern Pipeline Construction Co. v. Marathon Pipe Line Co.*, 458 U.S. 50, 73 L. Ed. 2d 598, 102 S. Ct. 2858 (1982), Akzo characterizes the current § 337 proceedings as "inherently judicial" [**49] involving "essentially private rights" and concludes that the Constitution requires adjudication of § 337 issues by Article III courts. Both Akzo's premise and conclusion are flawed. Although it is true that private rights may be affected by § 337 determinations, the thrust of the statute is directed toward the protection of the public interest from unfair trade practices in international commerce. As this court recognized in *Young Engineers, Inc. v. U.S. International Trade Commission*, 721 F.2d 1305, 1315, 219 U.S.P.Q. (BNA) 1142, 1152 (Fed. Cir. 1983), a § 337 proceeding "is not purely private litigation 'between the parties' but rather is an 'investigation' by the Government into unfair methods of competition or unfair acts in the importation of articles into the United States." Moreover, "the power to regulate commerce with foreign nations is expressly conferred upon Congress, and being an enumerated power is complete in itself, acknowledging no limitations other than those prescribed in the Constitution." *Buttfield v. Stranahan*, 192 U.S. 470, 492, 48 L. Ed. 525, 24 S. Ct. 349 (1904). [**50] Properly viewed, § 337 and its predecessor provisions represent a valid delegation of this broad Congressional power for the public purpose of providing an adequate remedy for domestic industries against unfair practices beginning abroad and culminating in importation. *Sealed Air Corp. v. U.S. International Trade Commission*, 68 C.C.P.A. 93, 645 F.2d 976, 985-86, 209 U.S.P.Q. (BNA) 469, 478 (CCPA 1981).

C. *Du Pont's pricing practices.* Under Du Pont's value-in-use pricing program, the price at which Du Pont sells aramid fibers varies in accordance with the particular end-use to which the purchaser puts the product. Although Du Pont's customers may use the aramid fibers for whatever purpose they desire, they are required to pay Du Pont the price appropriate to the ultimate end-use. To that objective, Du Pont requires its customers to agree that they will use the aramid fibers for the specific end-use for which they are purchased or, if the aramid fibers are put to a different end-use or are resold, that they will pay Du Pont an amount representing the difference between the initial purchase price and the price for the ultimate end-use.

According to Akzo, each [**51] such agreement constitutes a "contract . . . in restraint of trade," and the entire pattern of agreements, policing and surveillance constitutes a "combination . . . in restraint of trade" within the meaning of § 1 of the Sherman Act. Although the Commission specifically found that "the adoption of Du Pont's value-in-use pricing strategy reflects price

competition with other substitute products [*1489] for various end uses," Akzo continues to argue that Du Pont's value-in-use pricing for aramid fibers violates the antitrust laws.

Plainly, value-in-use pricing is not *per se* an anti-competitive restraint on trade within the meaning of the antitrust laws. In *Carter-Wallace, Inc. v. United States*, 196 Ct. Cl. 35, 449 F.2d 1374, 171 U.S.P.Q. (BNA) 359 (Ct. Cl. 1971), one of this court's predecessor courts sustained against an antitrust challenge a pricing system in which purchasers paid a lower price for the drug meprobamate when used in certain combination drugs. The court noted that "the vendee firms, if one looks at their business as a whole, are not prohibited [*52] or deterred from making any use they wish of the meprobamate." *Id.* at 1379, 171 U.S.P.Q. (BNA) at 362. Moreover, "it is even reasonable to assume, nothing else appearing, that if the vendees change their minds after purchasing the drug at the lower price they can make unrestricted use of it by paying the difference between that lower price and the consent-decree price." *Id.* at 1379 n.4, 171 U.S.P.Q. (BNA) at 362 n.4.

Similarly, under Du Pont's value-in-use pricing system, its customers may use their aramid fibers for whatever purpose they desire, including resale, providing they pay Du Pont the price appropriate to the ultimate end-use. Contrary to Akzo's position that Du Pont's pricing system is anti-competitive and an unreasonable restriction on use and resale, the Commission found and the record establishes that Du Pont's value-in-use pricing has the pro-competitive effect of increasing the volume of aramid fibers that are sold.

Akzo also claims that the ALJ erred in not making specific findings on market definition. But, as this court recently observed, the trier of fact need not engage in the meaningless exercise of market definition where no wrongful conduct has been [*53] shown. *Loctite Corp. v. Ultraseal Ltd.*, 781 F.2d 861, 875, 228 U.S.P.Q. (BNA) 90, 100 (Fed. Cir. 1985). Equally groundless is Akzo's contention that the ALJ erred by not shifting to Du Pont the burden of demonstrating that its pricing policies had pro-competitive effects. The Supreme Court, in *National Collegiate Athletic Ass'n v. Board of Regents*, 468 U.S. 85, 82 L. Ed. 2d 70, 104 S. Ct. 2948 (1984), made abundantly clear that the burden of proof shifts only where the evidence shows that the challenged practice has the "hallmarks of anti-competitive behavior," namely, that "it has operated to raise prices and reduce output." *Id.* at 113. Conversely, in this case, the evidence establishes and the Commission found that the alleged "restraint," value-in-use pricing, results in reduced prices and increased output.

D. *Du Pont's alleged inequitable conduct in manufacture.* During the proceedings below, Akzo asserted that Du Pont infringed Akzo's U.S. patent 4,308,374 ('374 patent) on a polymerization solvent system used in the formulation of the polymer which is spun into aramid fibers by means of the Blades '756 process. Notwithstanding [*54] § 337(c) of the Tariff Act of 1930 which provides that "all legal and equitable defenses may be presented," the ALJ struck Akzo's equitable defense and refused to hear the underlying evidence. On appeal, Akzo contends that the ALJ thus denied Akzo the opportunity to establish a meritorious defense to Du Pont's § 337 claim. For two reasons we disagree that this defense was meritorious.

Our conclusion is first supported by the recent decision of the District Court for the Eastern District of Virginia holding the '374 patent invalid for obviousness under 35 U.S.C. § 103. *Akzo N.V. v. E.I. DuPont de Nemours & Co.*, 635 F. Supp. 1336 (E.D. Va. 1986), on appeal to this court, No. 86-1327/1358. n16 Under that decision, Akzo's infringement claim has been adversely decided and Du Pont has a legal right to do the act claimed to be infringing. Consequently, there is as yet no legitimate [*1490] basis for Akzo's equitable defense. See *Young Engineers, Inc. v. U.S. International Trade Commission*, 721 F.2d 1305, 1315-16, 219 U.S.P.Q. (BNA) 1142, 1152 (Fed. Cir. 1983). [*55] Second, this same result is compelled in this instance by this court's decision in *SSIH Equipment S.A. v. U.S. International Trade Commission*, 718 F.2d 365, 218 U.S.P.Q. (BNA) 678 (Fed. Cir. 1983). In *SSIH*, we held that allegedly "inequitable conduct" is not a defense to a § 337 action where the conduct occurred after issuance of the complainant's patent and involved a different patent. *Id.* at 378-79, 218 U.S.P.Q. (BNA) at 689-90. In this case, Du Pont's '756 patent was issued in 1973 and pertains to a spinning process; Akzo's '374 patent was issued in 1981 and pertains to a polymerization process.

n16 That appeal was argued on November 7, 1986 before the same panel of judges as heard the current appeal.

Conclusion

For these reasons, we affirm the Commission's exclusion order prohibiting the importation into the United States of aramid fibers manufactured by Akzo in the Netherlands.

AFFIRMED.



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,945	07/24/2003	Dennis J. Jones JR.	60073.0004US01	3664
23859	7590	07/27/2005	EXAMINER	
NEEDLE & ROSENBERG, P.C. SUITE 1000 999 PEACHTREE STREET ATLANTA, GA 30309-3915			HAMLIN, DERRICK G	
			ART UNIT	PAPER NUMBER
			1751	

DATE MAILED: 07/27/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/627,945	JONES, DENNIS J.	
	Examiner	Art Unit	
	Derrick G. Hamlin	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 13 July 2005.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 45-53 is/are pending in the application.
- 4a) Of the above claim(s) 54-67 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 45-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Status of Claims

Claims 45-67 are currently pending.

Claims 46-53 have been withdrawn.

Claims 45-53 were provisionally elected during a telephone conversation with C. J. Hutter on 12/1/04, with traverse.

The rejection of claim 45-47 under 35 U.S.C. 102(b) as being anticipated by Gamblin (US 4842646 A), is maintained for the reasons set forth in the rejection dated 12/17/04.

The rejection of claim 45-50 and 52 under 35 U.S.C. 102(b) as being anticipated by DeLathauwer et al (US 5,738,688 A), is maintained for the reasons set forth in the rejection dated 12/17/04.

The rejection of claim 51 and 53 under 35 U.S.C. 103(a) as being unpatentable over DeLathauwer et al (US 5,738,688 A), is maintained for the reasons set forth in the rejection dated 12/17/04.

Election/Restrictions

Applicant's election with traverse of claims 45-53, drawn to an aqueous treating composition in the reply filed on 4/10/05 is acknowledged. The traversal was not based on any ground(s). This is not found persuasive because there is no reason cited for a traversal.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 102

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant argues that both the rejections, Gamblin and DeLathauwer, fail to teach less than 3% by weight of gallic acid, because they do not recognize that gallic acid can be in tannic acid. The applicant offers no proof that this assumption is true and applicant's arguments or conclusionary statements unsupported by factual evidence. In fact, the plain language of the claims would indicate that the both the inventors did recognize that they are different and may be used separately as they site them separately.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Applicant argues that the rejection over DeLathauwer fail to teach less than 3% by weight of gallic acid. Again, the applicant offers no proof that this assumption is true and applicant's arguments or conclusionary statements unsupported by factual evidence. In fact, the plain language of the claims would indicate that the both the inventors did recognize that they are different and may be used separately as they site them separately.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derrick G. Hamlin whose telephone number is (571) 272-1317. The examiner can normally be reached on Monday-Fridays from ~8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta, can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Art Unit: 1751

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

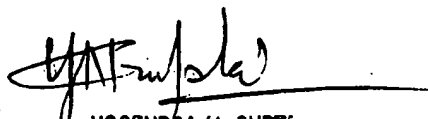
you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free).

Derrick G. Hamlin

7/24/05

BA



YOGENDRA N. GUPTA
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 1700



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,945	07/24/2003	Dennis J. Jones JR.	60073.0004US01	3664

23859 7540 12/17/2004
NEEDLE & ROSENBERG, P.C.
SUITE 1000
999 PEACHTREE STREET
ATLANTA, GA 30309-3915

EXAMINER

HAMLIN, DERRICK G

ART UNIT PAPER NUMBER

1751

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/627,945

Applicant(s)

JONES, DENNIS J.

Examiner

Derrick G. Hamlin

Art Unit

1751

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
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Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 45-67 is/are pending in the application.
- 4a) Of the above claim(s) 54-67 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☐ Claim(s) 45-53 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
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- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
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- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
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Paper No(s)/Mail Date 10/04
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Election/Restrictions

Restriction to one of the following inventions is required under 35 U.S.C. 121:

- I. Claims 45-53, drawn to an aqueous treating composition, classified in class 8, subclass 115.51.
- II. Claims 54-67, drawn to a method for treating a fiber, classified in class 428, subclass 365.

The inventions are distinct, each from the other because of the following reasons:

Inventions I and II are related as product and process of use. The inventions can be shown to be distinct if either or both of the following can be shown: (1) the process for using the product as claimed can be practiced with another materially different product or (2) the product as claimed can be used in a materially different process of using that product (MPEP § 806.05(h)). In the instant case the product as claimed can be used in a materially different process of using that product.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification and recognized divergent subject matter, restriction for examination purposes as indicated is proper.

During a telephone conversation with J. Hutter on 12/1/04 a provisional election was made with traverse to prosecute the invention of Group 1, claims 45-53.

Affirmation of this election must be made by applicant in replying to this Office action.

Claims 54-67 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Evaluations of level of ordinary skill in the art requires consideration of factors such as various prior art approaches employed, types of problems encountered in the art, rapidity with which innovations are made, sophistication of technology involved, educational background of those actively working in the field, commercial success, failure of others, and the inventor's educational level.

The "person having ordinary skill" in this art has the capability of understanding the scientific and engineering principles applicable to the claimed invention. The references of record in this case reasonably reflect this level of skill.

Claims 45-47 rejected under 35 U.S.C. 102(b) as being anticipated by Gamblin (US 4842646 A).

Gamblin discloses a textile dye with the following preferred embodiment of an aqueous ink or dye bath comprising:

(a) about 0.0001 to about 15 parts by weight of a water insoluble nigrosine dye, induline dye or basic dye; (b) about 0.0001 to about 60 parts by weight of a

hydroxycarboxylic acid having at least three hydroxy groups; (c) about 0.0001 to about 60 parts by weight of a water miscible solvent; (d) about 25 to about 100 parts by weight of water; and optionally, (e) about 0.0001 to about 30 parts by weight of a mordant (e.g., tannic acid or gallic acid, preferably tannic acid). (col. 3, lines 50-68)

The reference is anticipatory.

Claims 45-50 and 52 are rejected under 35 U.S.C. 102(b) as being anticipated by DeLathauwer et al (US 5,738,688 A).

DeLathauwer invention consists of a process to improve the resistance to stains on fibres, processed or not, finished or not on the basis of dyeable natural or synthetic fibres, in particular polyamide. According to the invention the fibers with a solution containing tannic acid and a condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde. The treatment can be made before, during or after the dyeing process. The treatment is done in an acid medium. (abstract) According to the invention, the substrate, in acid medium, is treated with a solution containing 1 to 6% (weight %) active component, consisting of 10 to 90%, preferably 40 to 80% tannic acid (tannic acid component) and 10 to 90%, preferably 20 to 60% condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde (sulphon component). (col. 2, lines 20-24) To avoid oxidation of the substrate, it is also recommended to add a non volatile, non hygroscopic and preferably non corroding acid, as e.g. an aliphatic carboxylic acid such as citric acid or polyacrylic acids. (col. 3, lines 20-24) The sulphonic component is a condensation product of a sulphonated phenol- or naphtol-derivate with an aldehyde. Such compounds contain at least a sulphonic group in acid

Art Unit: 1751

and/or salt form, which is combined with at least a carbon atom of a phenol or naphthol group. (col. 3, lines 25-29) The solution containing both components must preferably have a pH between 2.5 and 5, and eventually be adjusted by adding an acid for instance a sulfamic acid, formic acid, acetic acid. (col. 3, lines 45-49) It can be advantageous to increase the molecular chain of the components for instance through cross-linking by adding to the solution or to the rinsing water a complexing agent, such as aluminium potassium sulphate or potassium antimonyl tartrate, or a compound reducing the solubility of the sulphon component, such as silicium dioxide gel, a magnesium or zirconium salt. (col. 3, lines 36-41) The reference also teaches the condensation products of sulphonated phenol- or naphthol-formaldehydes in presence of an alkalinemetal silicate. (col 1, lines 45-46)

The reference is anticipatory.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 51 and 53 are rejected under 35 U.S.C. 103(a) as being unpatentable over DeLathauwer et al (US 5,738,688 A).

The reference is relied upon for the reasons set forth in the rejection above.

The reference fails to teach the specific weight of solids and the concentration of the fluorochemical.

The reference does teach that a solution is formed and that methacrylic polymer are used, therefore there would be a reasonable expectation of success to modify the prior art to arrive at the instantly claimed invention because the prior art suggest a solution which by definition contains no solids and a polymer that is know to be mixed with a fluorochemical in the required amounts. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to create the instant composition in view of the reference.

In view of the forgoing, the above claims have failed to be patently distinguishable over prior art.

The remaining references listed on form(s) 892 and/or 1449 have been reviewed by the examiner and are considered to be cumulative to or less material than the prior art references relied upon in the rejection above.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 4822373 A discloses a process for providing polyamide materials with stain resistance and teaches that it is well know in the art to use fluorochemical compositions for providing oil and water repellency can also be applied in conjunction with the sulfonated novolak resin and the methacrylic polymer. The

fluorochemical composition is simply added in an appropriate amount to the treating solution.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Derrick G. Hamlin whose telephone number is (571) 272-1317. The examiner can normally be reached on Monday-Fridays from ~8:30 AM to 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Dr. Yogendra Gupta, can be reached on (571) 272-1316. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Derrick G. Hamlin

12/9/04



NICHOLUS OGDEN
PRIMARY EXAMINER

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:)	
)	
Jones, Jr.	)	Art Unit: 1751
)	
Application No.: 10/627,945	)	Examiner: Ogden, N.
)	
Filing Date: July 24, 2003	)	Confirmation: 3664
)	
For: "METHODS OF TREATING AND)	
CLEANING FIBERS, CARPET YARNS AND)	
CARPETS")	

RESPONSE TO OFFICE ACTION

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

NEEDLE & ROSENBERG, P.C.
Customer No. 23859

March 23, 2006

Sir:

In response to the Office Action mailed January 11, 2006, please amend the above-referenced application as indicated and consider the following remarks.

Amendments to the Claims begin on page 2 of this paper.

Remarks/Arguments begin on page 4 of this paper.

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application. In amendments to the claims, additions are represented by **bold underlining** and deletions are represented by ~~striketrough~~ or, in cases of five characters or fewer, by **[[double brackets]]**.

LISTING OF CLAIMS

1-44. (canceled)

45. (currently amended) An aqueous treating composition comprising tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), ~~based on the weight of the tannic acid,~~ wherein the tannic acid is present in the aqueous treating composition ~~in a concentration of from greater than 0 pbw~~ **at up** to about 0.5 pbw, based on a total weight of the aqueous treating composition.

46. (previously presented) The treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 2.0 pbw.

47. (previously presented) The treating composition of claim 45, wherein the tannic acid is present in the composition at from about 0.005 pbw to about 0.4 pbw.

48. (previously presented) The aqueous treating composition of claim 45 having a pH of less than about 3.0.

49. (previously presented) The aqueous treating composition of claim 45, further comprising:

- a) a stain resist compound;
- b) a crosslinking agent;
- c) a fluorochemical; or
- d) an organosilicate material.

50. (previously presented) The aqueous treating composition of claim 49, wherein the stain resist compound is present and comprises:

- a) a polymer or copolymer of methacrylic acid;
- b) a phenolic resin;
- c) styrene-maleic anhydride copolymer; or
- d) an aqueous emulsion of polymerized monomers, wherein the monomers comprise (meth)acrylic acid, alkyl (meth)acrylic acid, and a substituted or unsubstituted styrene.

51. (previously presented) The aqueous treating composition of claim 49, wherein the stain resist compound is present at from greater than 0.0 pbw to about 2.0 pbw solids, based on a total weight of the aqueous treating composition.

52. (previously presented) The aqueous treating composition of claim 49, wherein the crosslinking agent is present and comprises antimony potassium tartrate or stannous chloride.

53. (currently amended) The aqueous treating composition of claim 49, wherein the fluorochemical is present at from about ~~[[0.0001]]~~ 0.001 pbw to about 5.0 pbw, based on a total weight of the aqueous treatment composition.

54-67. (canceled)

68. (new) The treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 2.87 pbw.

69. (new) The treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 1.0 pbw.

REMARKS/ARGUMENTS

Claims 45-53 and 68-69 are pending. Claims 1-44 and 54-67 were canceled by previous amendment. Claims 45 and 53 have been amended herein. New claims 68 and 69 have been added herein. No claim has been canceled herein.

Oath/Declaration

While Applicant asserts that no new matter was added by preliminary amendment filed October 26, 2004, in order to expedite prosecution, enclosed herewith is a new oath/declaration executed by the inventor.

Claim Amendments

Claim 45 has been amended herein to recite an aqueous treating composition comprising tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw), wherein the tannic acid is present in the aqueous treating composition at up to about 0.5 pbw, based on a total weight of the aqueous treating composition. No new matter has been added by this amendment. Support can be found throughout the specification and specifically at, *inter alia*, claim 45 before amendments following the telephone interview of October 18, 2005. Because the present amendments to claim 45 reverse amendments made in response to the Office Action mailed July 27, 2005, following the telephone interview of October 18, 2005, Applicant expressly denies surrender of subject matter and/or equivalents relating to the amendments in the response dated October 28, 2005.

Claim 53 has been amended herein to recite, *inter alia*, the fluorochemical is present at from about 0.001 pbw to about 5.0 pbw, based on a total weight of the aqueous treatment composition. No new matter has been added by this amendment. Support can be found throughout the specification and specifically at, *inter alia*, page 9, line 30 of the specification, as filed.

New Claims

New claim 68 recites the treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 2.87 pbw. No new matter has been added with this new claim. Support can be found throughout the specification and specifically at, *inter alia*, Table 4 (page 38), Table 6 (page 41), Table 8 (page 44), and Table 10 (page 47) in the specification, as filed.

New claim 69 recites the treating composition of claim 45, wherein the tannic acid has a gallic acid content of less than about 1.0 pbw. No new matter has been added with this new claim. Support can be found throughout the specification and specifically at, *inter alia*, page 6, line 24 of the specification, as filed.

Claim rejections under 35 U.S.C. § 112

The Office Action has rejected claims 45 and 53 under 35 U.S.C. § 112, first paragraph, as allegedly failing to comply with the written description requirement.

The Office Action alleges that the phrase “based on the weight of [the] tannic acid,” as stated in claim 45, is new matter but that the specification is clear that the gallic acid content is based on the tannic acid and, therefore, the phrase is redundant. Claim 45, as amended herein, does not recite the phrase “based on the weight of the tannic acid.” Therefore, this rejection is obviated.

The Office Action also alleges that the phrase “in a concentration of from greater than 0 pbw,” as stated in claim 45, is new matter. While the specification is clear that the tannic acid may be present in the claimed concentration range, the claims calling for a composition with “less than X%” of a substance do not call for a composition having 0% of the substance, but, rather, a composition which contains some amount of the substance, however small, with X% as maximum. *Ex parte Adams*, 77 U.S.P.Q. (BNA) 482 (1947). (A copy of *Ex parte Adams* is enclosed herewith for the Examiner’s convenience.) One of ordinary skill in the art would understand the phrase “present . . . at up to about X pbw” to be analogous to the phrase “less than X%.” The phrase “in a concentration of from greater than 0 pbw” is, therefore, redundant in view of either the specification or the legal meaning of “at up to about 0.5 pbw.” Claim 45, as

amended herein, does not recite the phrase “in a concentration of from greater than 0 pbw.” Therefore, this rejection is obviated.

The Office Action also alleges that the phrase “0.0001 pbw to about 5.0 pbw,” as stated in claim 53, is new matter. While the fluorochemical can be present in the inventive compositions in any concentration, in order to expedite prosecution, claim 53 has been amended herein to recite “0.001 pbw to about 5.0 pbw.” Therefore, this rejection is overcome.

Rejections under 35 U.S.C. § 103(a)

As an initial matter, the Office Action does not reject the pending claims under 35 U.S.C. § 102(b), thereby indicating that these claims are not anticipated by the cited references.

De Lathauwer

Claims 45-50 and 52 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over U.S. Patent No. 5,738,688 to De Lathauwer (“De Lathauwer”). Applicant respectfully disagrees.

De Lathauwer does not render the claimed compositions obvious. That is, De Lathauwer provides no motivation or suggestion to use “tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw)” to practice its disclosed compositions. *See* MPEP § 2143 (“The teaching or motivation to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant’s disclosure.”) (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)). In fact, as conceded by the Office Action, “De Lathauwer is silent with respect to the gallic acid content.” Instead of teaching that the gallic acid content of the tannic acid can be less than about 3.0 parts by weight, De Lathauwer discloses that “[a]ccording to the invention, any commercial tannic acid can be used,” (*see* U.S. Patent No. 5,738,688; column 2; lines 66-67), presumably including tannic acids that do not have a gallic acid content of less than about 3.0 parts by weight. Thus, De Lathauwer fails to provide any motivation to select tannic acid having a gallic acid content of less than about 3.0 parts by weight. Therefore, De Lathauwer cannot render obvious amended claim 45 or those claims depending therefrom (*i.e.*, claims 46-53 and 68-69).

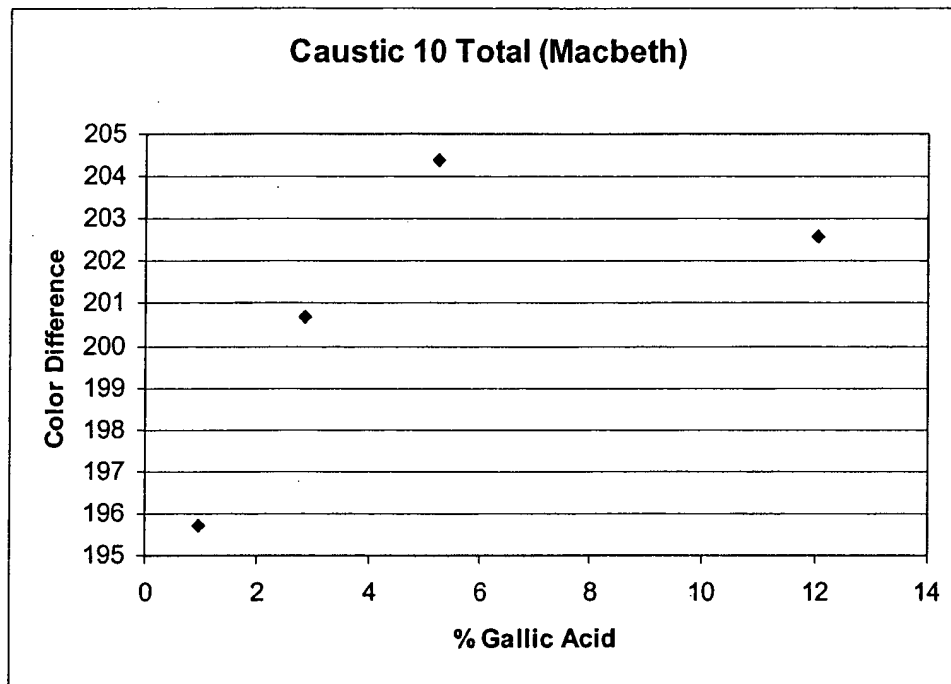
Even if the selection of tannic acid having a gallic acid content of less than about 3.0 parts by weight were rendered *prima facie* obvious by De Lathauwer, *which it is not*, such a rejection of the present claims would be rebutted by unexpectedly superior results achieved when selecting tannic acid having a gallic acid content of less than about 3.0 parts by weight, as shown in the specification as filed.

Specifically, the compositions of the present invention have markedly improved resistance to discoloration, or “browning,” which can be caused by contact of the treated fiber, yarn, or carpet with relatively high pH cleaning compositions. Such contact can occur frequently during routine maintenance of the treated fiber, yarn, or carpet. The tendency of a treated fiber, yarn, or carpet to “brown” when contacted with high pH cleaning compositions can be evaluated, for example, by measuring the color difference in a treated fiber, yarn, or carpet before and after application of a 10% by weight sodium hydroxide solution (“Caustic 10”; *see* specification at page 30). The color difference can be evaluated, for example, by using a Macbeth contact spectrophotometer model 20/20 (“Macbeth”). *See* specification at page 30.

As described at page 31 of the specification, four tannic acids having differing gallic acid contents were evaluated. The “Caustic 10” test, using the “Macbeth” measurement method, was used to evaluate samples of treated fiber, yarn, or carpet, as set forth in Table 4 (page 38), Table 6 (page 41), Table 8 (page 44), and Table 10 (page 47) of the specification, as filed. Exemplary results are summarized below:

Tannic Acid	% Gallic	Caustic 10 (Macbeth)
ASP	0.96	195.7
3SP	2.87	200.7
CLM	5.26	204.4
BAYGARD® CL Liquid	12.05	202.6

A lower “Macbeth” measurement for the Caustic 10 test denotes that the samples have a smaller change in coloration (*i.e.*, less “browning”) due to exposure to a 10% by weight sodium hydroxide solution; this indicates superior stain resistance. Close inspection of these results reveals that the color difference (“Macbeth”) between samples before and after contact with a 10% by weight sodium hydroxide solution is unexpectedly lower for samples treated with tannic acid having less than about 3% gallic acid, as shown in the graph below:



Consequently, De Lathauwer cannot render obvious amended claim 45 or those claims depending therefrom. In the same way, De Lathauwer fails to provide motivation to select tannic acid having a gallic acid content of less than about 2.87 parts by weight or of less than about 1.0 part by weight. Therefore, De Lathauwer cannot render obvious new claims 68 and 69.

Gamblin

Claims 45-47 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over to Gamblin (4,482,646). Applicant respectfully disagrees.

Like De Lathauwer, U.S. Patent No. 4,842,646 to Gamblin ("Gamblin") does not render the claimed compositions obvious. Specifically, Gamblin provides no motivation or suggestion to use "tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw)." See MPEP § 2143. In fact, as conceded by the Office Action, "Gamblin is silent with respect to the gallic acid content."

While the Office Action alleges that Gamblin in view of ordinary skill in the art renders the pending claims *prima facie* obvious, *which it does not*, such a rejection would be rebutted by unexpectedly superior results achieved when selecting a tannic acid having a gallic acid content of less than about 3.0 parts by weight, as set forth above.

Consequently, Gamblin cannot render obvious amended claim 45 or those claims depending therefrom. In the same way, Gamblin fails to provide motivation to select tannic acid having a gallic acid content of less than about 2.87 parts by weight or of less than about 1.0 part by weight; therefore, Gamblin cannot render obvious new claims 68 and 69.

Fekete

Claims 45-47 have been rejected under 35 U.S.C. § 103(a) as allegedly being obvious over Fekete (4,0984,701). Applicant respectfully disagrees.

Like De Lathauwer and Gamblin, U.S. Patent No. 4,094,701 to Fekete ("Fekete") does not render the claimed compositions obvious. Specifically, similar to the above discussion, Fekete provides no motivation or suggestion to use "tannic acid having a gallic acid content of less than about 3.0 parts by weight (pbw)." See MPEP § 2143. In fact, as conceded by the Office Action, "Fekete is silent with respect to the gallic acid content."

While the Office Action alleges that Fekete in view of ordinary skill in the art renders the pending claims *prima facie* obvious, *which it does not*, such a rejection would be rebutted by unexpectedly superior results achieved when selecting a tannic acid having a gallic acid content of less than about 3.0 parts by weight, as set forth above.

Consequently, Fekete, like De Lathauwer and Gamblin, cannot render obvious amended claim 45 or those claims depending therefrom. In the same way, Fekete fails to provide motivation to select tannic acid having a gallic acid content of less than about 2.87 parts by weight or of less than about 1.0 part by weight; therefore, Fekete cannot render obvious new claims 68 and 69.

De Lathauwer in view of Jones, Jr.

Claims 51 and 53 have been rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over De Lathauwer in view of U.S. Patent No. 5,520,962 to Jones, Jr. Applicant respectfully disagrees.

In order to render a claim obvious, the asserted combination must teach or suggest all claim limitations. MPEP § 2143.03 (citing *In re Royka*, 180 U.S.P.Q. 580 (C.C.P.A. 1970) (stating that all claim limitations must be taught or suggested by the prior art)). The pending claims, including claims 51 and 53, recite, *inter alia*, a gallic acid content of less than about 3.0 parts by weight element. Neither De Lathauwer nor Jones, Jr. teaches or suggests a tannic acid having a gallic acid content of less than about 3.0 parts by weight. In fact, as conceded by the Office Action, “De Lathauwer is silent with respect to the gallic acid content.”

Because neither De Lathauwer nor Jones, Jr. teaches or suggests this element, the combination of De Lathauwer in view of Jones, Jr. fails to teach or suggest all recited claim limitations and, therefore, cannot render *prima facie* obvious the pending claims. Even assuming *arguendo* that the cited combination rendered *prima facie* obvious the pending claims, *which it does not*, such a rejection would be rebutted by unexpectedly superior results achieved when selecting tannic acid having a gallic acid content of less than about 3.0 parts by weight, as set forth above.

Combinations of De Lathauwer, Gamblin, Fekete, and/or Jones, Jr.

Because, as set forth above, neither De Lathauwer, nor Gamblin, nor Fekete, nor Jones, Jr. teaches or suggests tannic acid having a gallic acid content of less than about 3.0 parts by weight, any combination of De Lathauwer, Gamblin, Fekete, and/or Jones, Jr. fails to teach or suggest all claim limitations, as required to render a claim *prima facie* obvious. MPEP § 2143.03.

Even assuming *arguendo* that a combination rendered *prima facie* obvious the pending claims, *which it does not*, any such rejection would be rebutted by unexpectedly superior results achieved when selecting tannic acid having a gallic acid content of less than about 3.0 parts by weight, as set forth above.

Obviousness-Type Double Patenting

Claims 45-53 have been rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 62-67 of Jones, Jr. in view of De Lathauwer. Applicant respectfully disagrees.

First, the Office Action fails to analyze the factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are required for establishing a background for determining obviousness under 35 U.S.C. § 103 when making an obvious-type double patenting analysis. MPEP § 804 (II)(B)(1). For example, the Office Action does not:

- (A) Determine the scope and content of a patent claim and the prior art relative to a claim in the application at issue;
- (B) Determine the differences between the scope and content of the patent claim and the prior art as determined in (A) and the claim in the application at issue;
- (C) Determine the level of ordinary skill in the pertinent art; and
- (D) Evaluate any objective indicia of nonobviousness.

Nonetheless, in order to expedite prosecution, Applicant addresses the rejection and asserts that the Office Action *cannot*, under any proper analysis, set forth a *prima facie* nonstatutory obviousness-type double patenting rejection. Specifically, the cited claims of Jones, Jr. do not recite “tannic acid having a gallic acid content of less than about 3.0 parts by weight.” Likewise, De Lathauwer fails to teach or suggest “tannic acid having a gallic acid content of less than about 3.0 parts by weight.” In fact, the Office Action concedes that “De Lathauwer is silent with respect to the gallic acid content.” Instead, the Office Action summarily concludes that the

“claims overlap in subject matter.” However, even under the doctrine of nonstatutory obviousness-type double patenting, all claim limitations must be taught or suggested.

Because the claims of Jones, Jr. do not recite this element and because De Lathauwer does not teach or suggest this element, the cited combination is not coextensive with the pending claims and, therefore, cannot render *prima facie* obvious the pending claims under the doctrine of nonstatutory obviousness-type double patenting.

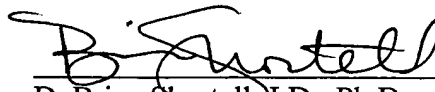
Even assuming *arguendo* that the cited combination is coextensive with the pending claims, *which it is not*, and that the pending claims are *prima facie* obvious under the doctrine of nonstatutory obviousness-type double patenting in view of that combination, *which they are not*, such a rejection would be rebutted by unexpectedly superior results achieved when selecting tannic acid having a gallic acid content of less than about 3.0 parts by weight, as set forth above.

CONCLUSION

In light of the above arguments and amendments, the claims are believed to be allowable, and Applicant respectfully requests notification of same. The Examiner is invited and encouraged to directly contact the undersigned if such contact may enhance the efficient prosecution of the application to issuance. No fee is believed due. However, the Commissioner is hereby authorized to charge any fees that may be required or credit any overpayment to Deposit Account No. 14-0629.

Respectfully submitted,

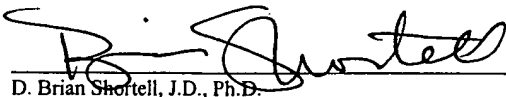
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D. Brian Shortell, J.D., Ph.D.
Registration No. 56,020

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CERTIFICATE OF MAILING UNDER 37 C.F.R. § 1.8

I hereby certify that this correspondence, including any items indicated as attached or included, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date indicated below.


D. Brian Shortell, J.D., Ph.D.

March 23, 2006
Date



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/627,945	07/24/2003	Dennis J. Jones JR.	60073.0004US01	3664

23859 7590 06/13/2006

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999 PEACHTREE STREET
ATLANTA, GA 30309-3915

EXAMINER

OGDEN JR, NECHOLUS

ART UNIT

PAPER NUMBER

1751

DATE MAILED: 06/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/627,945	JONES, DENNIS J.	
	Examiner	Art Unit	
	Necholus Ogden	1751	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.138(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 45-53, 68 and 69 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 45-53 and 68-69 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Response to Amendment

Oath/Declaration

1. Applicant has submitted a new oath/declaration.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 45 and 53, 68-69 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement is withdrawn in view of applicant's amendment.

Claim Rejections - 35 USC § 103

4. Claims 45-50 and 52 are rejected under 35 U.S.C. 103(a) as being unpatentable over De Lathauwer (5,738,688).
5. Claims 45-47 and 68-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gamblin (4,482,646).
6. Claims 45-47 and 68-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fekete (4,0984,701).

Fekete discloses an aqueous composition for cleaning tin surfaces comprising tannic acid in an amount from 0.01% by weight and greater (see col. 3, lines 1-8 and examples).

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7. Claim 51 and 53 is rejected under 35 U.S.C. 103(a) as being unpatentable over De Lathauwer (5,738,688) in view of Jones, Jr. (5,520,962).

Double Patenting

8. Claims 45-53 rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 62-67 of U.S. Patent No. 5,520,962 in view of De Lathauwer (5,738,688) is withdrawn in view of applicant's arguments.

Response to Arguments

Applicant argues that Gamblin, De Lathauwer, Fekete and/or Jones, Jr. do not suggest the gallic acid content of the claimed invention.

The examiner contends that the gallic acid content of the tannic acid components of the above listed prior art is silent, however, the burden is upon applicant to prove otherwise and it well known to the skilled artisan to optimize percentages, since gallic acid is acquired by the hydrolysis of tannic acid it would have been within the level of the skilled artisan to arrive at the gallic acid content absent a showing to the contrary commensurate in scope with the claimed invention. Moreover, by stating that any commercially available tannic acid can be used is a reasonable assumption that tannic acids of a range of gallic acid contents could be employed in a beneficial or synergistic manner.

"The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum combination of percentages" Peterson, 315 F.3d at 1330, 65 USPQ2d at 1382.

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With respect to applicant's Caustic 10 Total (Macbeth) table, it is the examiners position that the table is not unexpected because the prior art of record, specifically De Lathauwer, teaches that any commercial gallic acid may be used, which includes lower and upper amounts of tannic acid contents. Therefore, criticality has not been established since nothing unexpected is seen.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Necholas Ogden whose telephone number is 571-272-1322. The examiner can normally be reached on M-T, Th-Fri.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Douglas McGinty can be reached on 571-272-1029. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Necholus Ogden
Primary Examiner
Art Unit 1751

No
6-11-06